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Volume 198, Number 9
$6 per Annum, 25c per Copy

APRIL 19, 1928

Published Weekly in Boston
at 126 Massachusetts Avenue

CONTENTS

NEW ENGLAND BRANCH OF THE AMERICAN UROLOGICAL ASSOCIATION

Studies on the Etiology and the Treatment of Pyelitis in Pregnancy. *J. I. Hofbauer* 427

The Present Status of the Treatment of Genital Tuberculosis in the Male. *J. Dellinger Barney* 442

ORIGINAL ARTICLES

Observations on Spinal Anesthesia with a Report of 500 Cases. *Boris Rapoport* 447

MEDICAL PROGRESS

Progress in Thoracic Surgery for 1927. *Edward D. Churchill* 453

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

Case 14091—Recurrent Multiple Arthritis. *Richard C. Cabot.* Case 14092—An Obscure Abdominal Situation. *Edward L. Young, Jr.* 459

EDITORIALS

Laboratory Service 465
Progress in the Study of the Action of the Posterior Lobe of the Pituitary 466
The Prize for the Prevention and Cure of Cancer. 466
This Week's Issue 466

(Contents continued on next page)

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CONTENTS

(Continued)

THE MASSACHUSETTS MEDICAL SOCIETY
Section of Obstetrics and Gynecology 467
BOSTON MEDICAL LIBRARY 467
CORRESPONDENCE
Comments on the Art of Medicine. A. E. P. Rockwell 470
The Nursing Problem. Arthur H. Ring 470
MISCELLANY
Answers on Smallpox and Vaccination 464
Cancer Campaign in Massachusetts 468
Cancer Death Rate in Connecticut 458
Some Thoughts on the Papers Read Before the Suffolk District Medical Society on March 28, 1928 452
United States Civil Service Examination 464
United States Public Health Service. Chronological List of Changes. March 28, 1928 458
NEWS ITEMS 446, 471
NOTICES 471
OBITUARY 469
RECENT DEATHS 470
REPORTS AND NOTICES OF MEETINGS 471
SOCIETY MEETINGS 476

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VOLUME 198 APRIL 19, 1928 NUMBER 9

NEW ENGLAND BRANCH OF THE AMERICAN UROLOGICAL ASSOCIATION

STUDIES ON THE ETIOLOGY AND THE TREATMENT OF PYELITIS IN PREGNANCY*

BY J. I. HOFBAUER, M.D.†

THE topic of pyelitis in pregnancy has received active investigation and lively discussion for the past two decades and still remains one of the most puzzling and controversial problems both of obstetrics and urology. At the last meeting of the American Urological Association when a symposium on this subject was held in May, 1927, the impression prevailed that there is still a wide-spread diversity of present-day opinions concerning the pathology of the disease.

Opitz in a monograph on the subject (1905) attributed the condition to compression of the ureter, especially the right one, between the uterus and the brim of the pelvis, followed by a dilatation of the ureter above; while the concomitant infection was interpreted as of either hematogenous origin or due to an ascending process. This explanation was received as sufficient until recently when in studying frozen sections of pregnant women, the conception of ureteral pressure as an etiologic factor has proven largely untenable. Moreover, since the specific gravity of the uterus is the same as that of the other abdominal organs such a conception seemed incompatible with the laws of physics. In addition, many cases of pyelitis occur in early months of pregnancy when the idea of such a mechanism can hardly be maintained.

In view of the findings of hydro-ureter or ureteral stricture in patients who had been under observation for pyelitis during their pregnancy months or years before, several investigators advanced the idea that the occurrence of pyelitis most frequently represents merely a lighting up of a preëxisting process. (John T. Williams, Hunner, Corbus and Danforth.)

Since a number of patients presenting pyelitis in pregnancy offer a history of kidney infection in infancy, the importance of pyelitis in children as an etiologic factor in the production of ureteral stricture has been stressed by Goeppart, Pugh et al. In accord with this view, the development of pyelitis in pregnant women should be considered as a recrudescence of a condition acquired in childhood.

Frank Kidd controverts the foregoing explanation and holds that the ureter in pregnant women undergoes dilatation as the result of "loss of tone in the muscle of the ureter," due to a chemical poison in the blood as the possible factor involved in its atonic condition.

In the presence of such conflicting statements concerning the fundamental pathology of the condition, I believe that the problem can best be attacked from a combined point of view. Consequently a clear understanding of the anatomy of the ureter during pregnancy appeared to be the first consideration, and this was obtained by the microscopic study of fourteen specimens received at autopsy upon pregnant women during the last three years. Also, bearing in mind that in recent years a definite decrease in antibodies has been established in various infections occurring in pregnant women, it seemed desirable to study the defensive forces of the serum against B. Coli during pregnancy. Moreover, it appeared important in our correlated study to gain a correct idea of the after-effects of pyelitis; more particularly since this field of inquiry has largely been neglected and the realization of the after-effects of the condition might lead to certain changes in the treatment of the disease.

PATHOLOGY

With regard to the conditions of the ureter in pregnant women, two facts have come to be established on a firm basis during the last two decades: namely, the frequent occurrence of ureteral dilatation and consequent upon it a certain degree of atony of the ureter, as shown by a delay in ureteric action. While former investigators, (Olshausen, Jolly and others,) when studying the gross features of the ureter at autopsy, reported that dilatation was noted in 19 per cent. of pregnant women; modern methods of examination, particularly pyelograms, reveal an incidence of 80 per cent. and even more (Albarran, Halstead, Kretschmer and Heaney, Crabtree, and others). F. Kidd and Stöckel in

*Read (by invitation) before the New England Branch of the American Urological Association, January 16, 1928 (52d meeting).

†For record and address of author see "This Week's Issue," page 466.

reviewing the results obtained by themselves and others, emphasize the common occurrence of ureteral dilatation in pregnant women and consider a moderate degree of hydroureter an almost constant physiological concomitant of pregnancy. Kaltenschnee showed that in pregnant women there is both a marked delay in the excretion of injected dyes and a prolongation of the contraction intervals of ureteral peristalsis. H. S. Pugh in a recent communication reports that in 100 apparently normal pregnant women examined between the seventh and ninth months of pregnancy he noted that the ureters were very sluggish in their action in 80 per cent. of the cases. In practically every instance there was ureteral retention, mostly on the right side.

Since the conceptions put forward in regard to the etiology of these phenomena have generally been adjudged insufficient to elucidate the process, we have attempted to find an acceptable explanation by carefully studying the morbid anatomy of the urinary tract with the view of ascertaining, if possible, the existence of some obstructive lesion in its lower portion. Such a study appeared the more desirable since accurate data along such lines are almost entirely lacking; although many investigators hold that in all cases of urinary infection, the presence of some existing inadequacy in ureteral calibre should be considered as the chief cause of dilatation, and that such obstructions are more commonly present than is generally believed. (H. P. Winsburg White, Ball.)

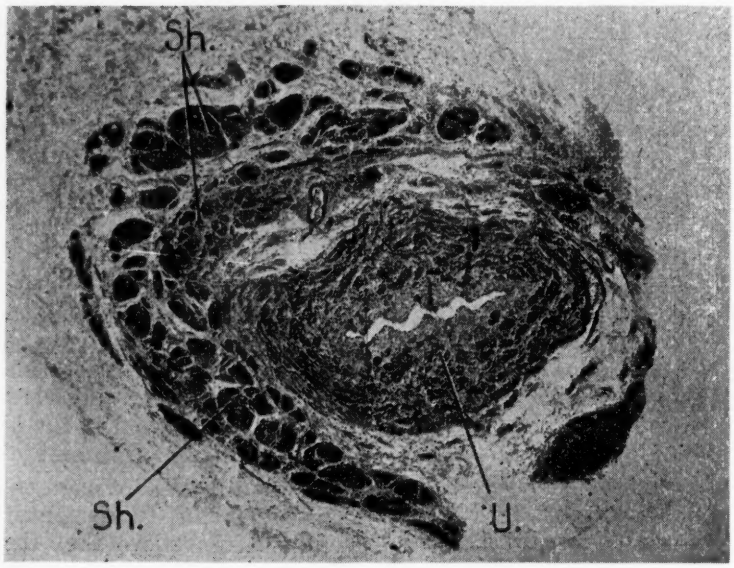

FIG. 1. Pregnant ureter at term, juxtavesical portion 2 mm. above uretero-vesical junction. Sh. = Ureteral sheath. U = Ureter.

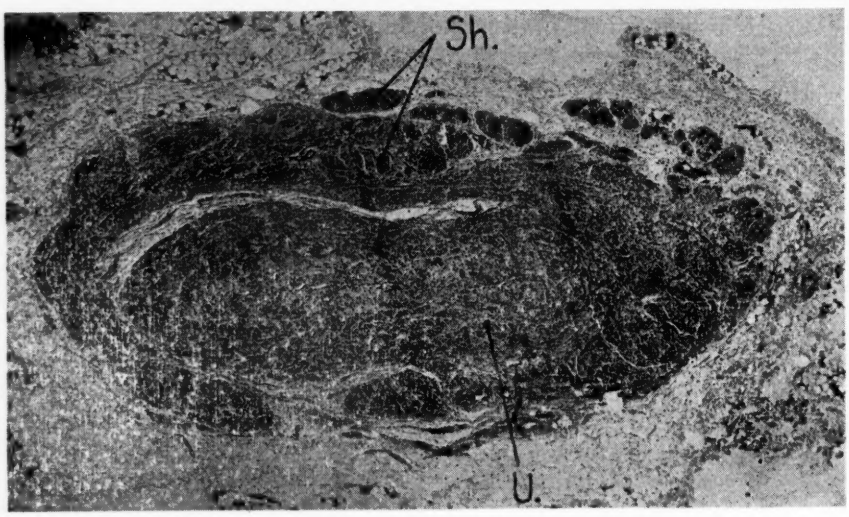

FIG. 2. Another specimen: in the same locality.

Upon studying the conditions obtaining in the pelvic portion of the ureter during pregnancy, we noted certain definite hyperplastic and hypertrophic changes both in the musculature and the connective tissue, to which we believe atten-

tion has heretofore not been directed. Such hypertrophy is particularly pronounced in the juxtavesical portion of the ureter where it passes through the paramentrium and lies in close contact with both the bladder and the anterior vaginal vault. Similar conditions likewise obtain in the trigonum vesicae and account for certain changes in that region which can be readily seen on cystoscopic examination. It is characteristic that the hypertrophy of the constituents of the ureter within the abdominal portion, although distinctly noticeable, are decidedly less marked than in its pelvic portion.

In dealing with the subject, we desire to present our observations concerning the histology of the different parts of the urinary tract during gestation.

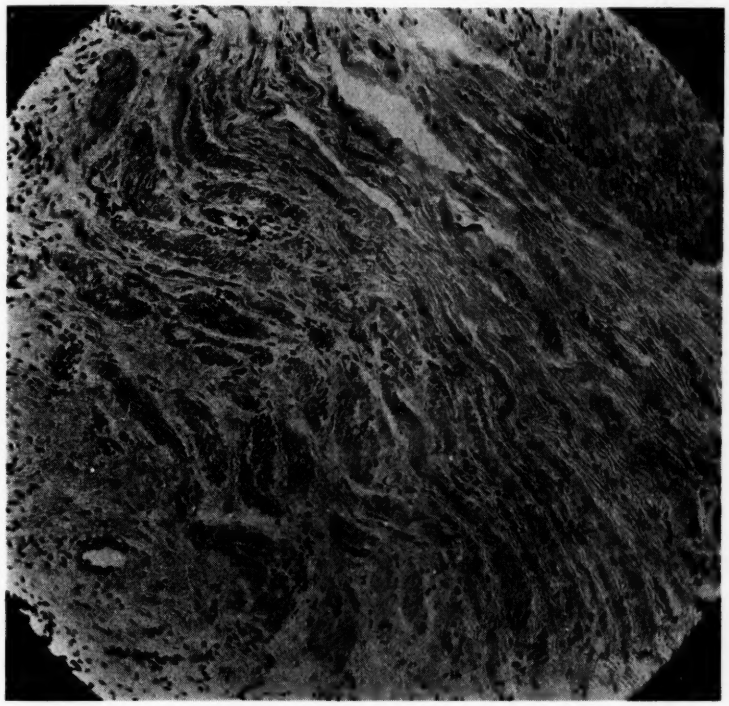

FIG. 3. Microphotograph of juxtavesical portion of non-pregnant ureter.

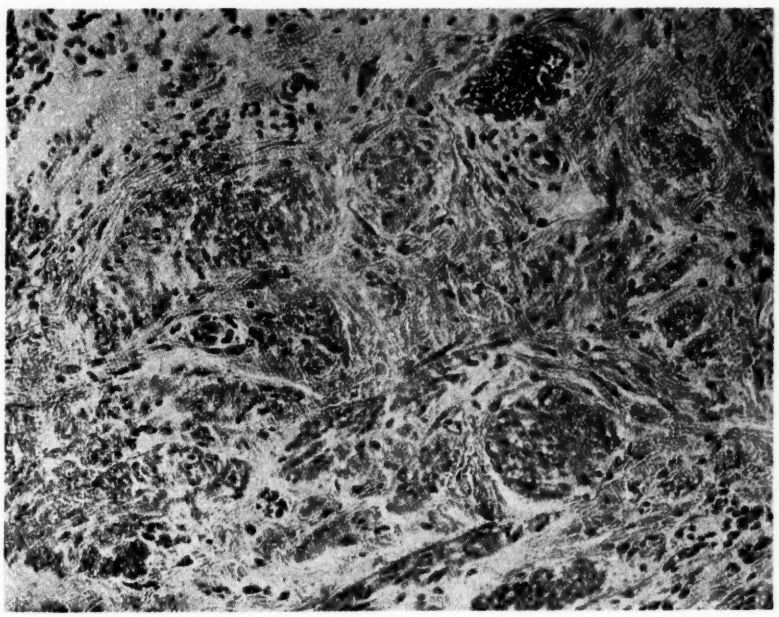

FIG. 4. Microphotograph of juxtavesical portion of pregnant ureter. Note abundance of fibroblasts between muscle-bundles.

Juxtavesical Portion of the Ureter

The most important feature of this picture is the excessive hypertrophy of the ureteral sheath. This, although invariably present, varies

within certain limits in the specimens examined. Photomicrograms I and II show remarkable development of the ureteral sheath, which almost entirely encircles the ureter. Over about one-half of its periphery, the ureter itself is separated from the sheath by a visible cleft; while on the opposite half no discernible cleavage can be seen, both the ureter and its sheath appearing intimately connected. Whereas in non-pregnant women the ureteral sheath is built up of a moderate number of thin and a few broader muscular strands, the diameter of this structure in pregnancy equals or even exceeds the diameter of the ureter itself. In addition, even under low magnification, the whole architecture of the ureteral sheath appears changed, due to the presence of a considerable amount of connective tissue interspersed between the thick muscle bundles, thus creating a rather rigid structure. Under higher magnification, the individual muscle fibers appear broader and longer than under normal conditions, and in places groups of them are spread apart by a slight oedema. The connective tissue, on the other hand, shows a marked increase in young fibers; in places the collagenous type of fiber prevails. Within the connective tissue spaces there can be seen occasionally an aggregation of new-formed unstriated muscle fibers. The wall of the ureter itself is characterized by a marked thickening of the individual muscle bundles and an increase of the connective tissue.

When compared with a normal ureter, (consult photomicrogram III) the difference both in the thickness of the muscle bundles and the development of connective tissue can be readily seen. Photomicrogram IV shows the presence of an abundance of fibroblasts in the wall of the pregnant ureter. I am especially interested in this phenomenon since I have also observed the development of new connective tissue in the lower uterine segment of the pregnant uterus.

As a matter of minor importance, the presence of a few mast-cells and mononuclear wandering cells in the interstices of the connective tissue within the uterine walls should be mentioned. The mucosa of the ureter shows a moderate thickening due both to oedema and to the occurrence of numerous young connective tissue fibers. Now and then, an accumulation of lymphoid tissue makes its appearance. The epithelium is arranged in several layers and the whole structure shows a definite enlargement, but no mitotic figures have been seen. The individual cell element has increased in size by about a third of its original diameter, while the cystoplasm appears almost twice as voluminous as in the nonpregnant specimen.

In the other specimens of our series, similar conditions obtain. As far as the ureteral wall is concerned, the interlacing of hypertrophied muscle bundles and hyperplastic connective tissue occurs invariably. It is chiefly the circular musculature of the ureter which undergoes this pronounced hypertrophy. As a consequence the whole ureter gives the impression of a rigid and unyielding organ, with its lumen narrowed, due to constriction effected both by the structural alterations in its wall and by the encircling sheath.

Intravesical Portion

As it passes through the bladder wall, the ureter normally retains its independence and appears separated from the bladder musculature by a layer of connective tissue. The muscular tissue of the ureter ultimately ends in the mucous membrane of the bladder around the ureteral orifice.

The microscopic picture of the intravesical portion of the ureter in the pregnant woman shows material variations, and its most conspicuous feature consists in an intense development of connective tissue, as evidenced by the presence of broad strands of both adult and young fibres. Numerous fibroblasts make their appearance chiefly in the connective tissue spaces of the distal half of the ureteral wall and its periphery, where the markedly thickened and hypertrophied muscle bundles of the ureteral sheath interlaced with the broad strands of connective tissue stand out in strong relief. The individual muscle bundles of the entire ureteral wall have undergone a degree of hypertrophy similar to that described in the juxtavesical portion; and, where the muscle structures at the ureteral opening become attached to the mucous membrane, the increase is particularly noticeable.

At this point I desire to call attention to another interesting phenomenon which has been observed in our series of specimens. Upon studying microscopic sections through the juxtavesical and intravesical portion of the ureter obtained from a patient in whom labor was terminated by a rather difficult craniotomy necessitated by pelvic dystocia, an effusion of blood was found within the mucosa, as well as scattered through the connective tissue spaces between the musculature of the ureter. Such traumatic lesions developing during the course of operative delivery have heretofore not been described, and their clinical significance and their after effects with respect to local infection and the consecutive formation of scar tissue offer an interesting urological problem.

Trigonum Vesicae

Consistent with the specific structural changes noted both in the juxtavesical and the intravesical portion of the ureter, there occurs during pregnancy a definite thickening of the entire trigonal muscle from the interureteral ridge to the vesico-urethral orifice. This hypertrophy is most pronounced in two different localities—in the interureteral ridge and adjacent to the vesical orifice, and is associated with an edematous imbibition of the interstices between the individual muscle fibers.

Another essential alteration in the structure of the trigonum consists in the increase, 20th in number and in size of the elastic fibers and a condensation of the connective tissue resulting from a considerable development of young fibers. By the close binding together of the bands of muscular fibers on one hand, and the hypertrophied connective tissue on the other—the trigone becomes converted into a dense and unyielding structure. The demonstration of such substantial changes in the anatomy of the trigonum in pregnant women may serve to elucidate some of the clinical phenomena, which will be subsequently considered in connection with our problem.

Upon studying microscopically the region of the neck of the bladder and the upper third of the urethra, a remarkable feature is presented during pregnancy by the condition of the striated muscle fibers which are interwoven with the nonstriated muscular coat of the urethra. In the non-pregnant woman this sheet of striated muscle is represented by a few transverse fibers, which extend on either side of the urethra from its posterior surface dorsalwards; whereas during pregnancy it develops to a considerable degree. This hypertrophy of the ureteral sphincter appears to be an important part of the hypertrophy which the entire muscle structure of the pelvic floor is known to undergo during pregnancy.

Upper Pelvic Portion of the Ureter

The moderate increase in thickness of the ureteral wall in this region is primarily the consequence of a definite broadening of its mucosa, which is due both to edema and to the appearance of a varying number of fibroblasts in the connective tissue layer. The undulating course of the loosely arranged connective tissue fibers both within the mucosa and between the muscle bundles closely approximates that observed under normal conditions, but in places a slight degree of hypertrophy of the muscle structure may be observed, while a few round cells, monocytes and plasma cells are found infiltrating the musculature and the mucosa.

Sections from the abdominal part of the ureter show essentially the same histological appearance, although the development of young connective tissue elements within the mucosa is even less pronounced than in the pelvic region.

It is the striking contrasts in the structure of the connective tissue spaces between the individual muscle bundles in the trigonum vesicae and in the adjacent portions of the ureter on one hand, and in the upper urinary tract on the other, which accounts for the impression of a rigid and unyielding structure in the former in contradistinction to the fairly normal appearance of the latter.

DISCUSSION

The evidence thus far adduced serves to establish the fact that during pregnancy there occur definite alterations in the architecture both of the trigonum vesicae and the lower part of the ureter. Evidence has been adduced to show that, by reason of these structural changes, a multiplicity of obstructive processes make their appearance in the lower urinary tract, but without any demonstrable indication either of an active or an older inflammatory process.

The study of our specimens has revealed the existence of conditions which could readily give rise to stenosis in the juxtavesical region of the ureter, and which in the main consist of a concentric hypertrophy of the entire ureteral wall, with the constriction still further accentuated by an encircling ring resulting from hypertrophy of the ureteral sheath. Since the striking increase in size of the latter is most noticeable at the junction of the ureter with the bladder, the inadequacy of the ureter as an efficient urinary duct becomes particularly marked in this locality, especially if it is recalled that a certain degree of narrowing at this point has come to be recognized as a physiological occurrence. Confirmation of our findings is afforded by the clinical observation noted first by Saenger that the ureters can be definitely felt on bimanual palpation in the second half of pregnancy.

In calling attention to the primary importance of the hyperplastic and hypertrophic changes in the lower part of the pelvic portion of the ureter, as essential factors in the narrowing of its lumen in the pregnant woman, it is in no way my desire to underestimate the significance of congestion and edema of the mucosa as contributory factors, as it is quite in accord with prevailing doctrines that such an occurrence may eventually turn the tide and render positive the hitherto potential obstruction of the ureter. More significant, however, in this regard, appears to be the development of an angulation of the right ureter at the distal end of its juxtavesical portion, as a result of the common dextrorotation of the pregnant uterus and of the firm attachment of the trigonum vesicae to its cervical portion; while, on the other hand, the same processes predispose to a stretching of the left ureter.

The essential nature of the process which Hunner designates as ureteral stricture consists in the development of scar tissue, which encroaches on the muscle structure and ultimately destroys the elasticity and the distensibility of the ureter. The characteristic feature in the architecture of the connective tissue during pregnancy, however, both in the juxtavesical and intravesical portion of the ureteral wall is the occurrence of an abundance of new formed fibers between the hypertrophied muscle bundles, thus forming a conspicuous fibro-cellular structure. Owing to the snug incorporation of these dense connective-tissue spaces in its muscular coat, the ureter in this region appears to have become converted from a collapsible organ into a more or less unyielding tube; or, to put it in another way, its juxtavesical portion is now

a rigid structure in itself, ensheathed by a thick muscular ring, and makes its way through the narrow space between the bladder wall and the anterior vaginal vault, where it readily assumes the features of a stricture.

In connection with the development of new connective tissue fibers in the lower portion of the ureter and in the trigonum vesicae, it is noteworthy that Stieve has adduced incontrovertible evidence of an active growth of the connective tissue elements in the vaginal wall during pregnancy; while our studies have revealed the interesting fact that a similar process occurs in the lower segment of the uterus, more particularly in the outer layers of the uterine wall and about the periphery of the large vessels and the thick muscle bundles.

In contrast to the regularity of the characteristic rearrangement of the lower part of the ureteral structure encountered in all of our specimens, the findings in its upper parts lack uniformity. The increase in size of the muscle bundles, although occasionally definite, appears by no means constant. On the other hand, the intercalation of fibroblasts both within the mucosa and the muscular coat extends throughout the whole course of the ureter. Similar observations have recently been made by Goldstein and Carson, and also by Küstner. But, in spite of a distinct increase of primitive fibers, the whole complex of the connective tissue in the upper urinary tract is loose and delicate in contradistinction to the density of structure seen in the lower urinary tract. In other words, it is chiefly the condition of the connective tissue spaces which accounts for the various degrees of resistance of the ureteral wall in different localities.

It is by attention to the histological details of the changes which occur in the trigonum vesicae during pregnancy, to which we have already referred, that we obtain a clear understanding of the fact that on cystoscopic examination in pregnant women the entire region of the trigonum frequently appears somewhat protruding and Mercier's bar particularly well marked. The recent clinical studies of Hinman and Wesson emphasize the fact that recognizable urinary obstruction is favored by hypertrophy of the trigone with a prominent plica ureterica, and the recognition of that fact affords a satisfactory explanation for the observation first made by Curtis that retention of several ounces of residual urine is frequently demonstrable during pregnancy.

Another point of clinical interest is the insufficiency of the ureterovesical valve in the latter months of pregnancy as first described by Gauss and corroborated by Stöckel, the writer, and others. In a recent study of sixty pregnant women in the Vienna clinic, Luchs stated that insufficiency of the ureterovesical orifice was a rather common occurrence. In addition, he emphasized that both Chromocystoscopy and Pyelography, showed a definite dilatation of the right ureter in 40 and a slighter degree of dilatation of the left ureter in 30 cases; and furthermore, that delay of ureteric action was noted in 41 out of 50 cases examined. In searching for an adequate explanation for the insufficiency of the ureteral orifice, I would refer to the peculiar structural changes occurring in the intravesical portion of the ureter. Here, only brief reference is possible to the interesting question of the relationship of this phenomenon to the possibility of urinary reflux and ascending infection, since the studies of Sampson, R. C. Graves, Wislocki and O'Conor, Eisendrath and others, have clearly shown that any interference with the valve-like mechanism of the ureteral orifices would favor the reflux of urine from the bladder into the ureter.

IMMUNOLOGY

For years, one of the chief subjects for discussion in connection with pyelitis in pregnancy has been the mode of entrance of the infecting organism into the renal pelvis. Once it had been realized that nothing is so conducive to urinary tract infection as stasis, both pelvic retention and accompanying infection constituted the main considerations. One of the interesting phases of this subject has been the lively discussion concerning the pathway by which the bacteria reach the upper part of the ureter and the pelvis. For a long time the theory of ascending infection held sway, but of late, in sharp contrast to that view, there has been a growing appreciation of the importance of hematogenous infection with subsequent renal excretion of the resorbed bacteria—"descending infection". While the proponents of both hypotheses are still at loggerheads, and a clear demonstration of either route is still lacking, an entirely new aspect of the problem has arisen from the recognition that another essential prerequisite for the production of pyelitis is to be postulated—the general or local decrease of resistance to infection. To put the matter in another way, those who have explored the field now stress the point that the mere coincidence of ureteral dilatation and presence of bacteria, although essential to the development of pyelitis, are not sufficient to set up infection; as another determining factor the disturbance of the equilibrium, due to a lowering of the normal immunity, has equally to be considered in the etiology of the disease. This advance in our knowledge is largely due to the excellent clinical studies of Frank Kidd, and is now recognized by Schlayer, Boeminghaus, v. Rihmer, H. Simon, and others.

By reason of the widespread interest attaching to the problem of immunity, a study of the immunological conditions obtaining in pregnant women when tested toward Bacterium coli was our first concern. With the object of learning something about the true state of affairs, Dr. Hildegard Dresel, of the department of Bacteriology, conducted last year, at my instigation, a

series of investigations concerning the opsonic index during pregnancy. Fifty pregnant women in the various months of pregnancy were indiscriminately chosen from our dispensary, as well as several ward patients, both normal and affected with pyelitis, and their serum was tested against three different strains of B. coli.

The following method was employed: Three different B. coli strains were used; two were obtained from the urine of pregnant women suffering from pyelitis, and one from the urine of an apparently normal pregnant woman. The strains were called B hemolytic, non hemolytic, and Keton, and the respective reactions are given in the following table:

		B hemolytic	Non hemolytic	Keton
Blood agar appearance (deep inoculation) after 18 hours		B hemolysis diameter 4 mm.	non hemolytic	B hemolysis diameter 1½-1¾ mm.
Fermentation reactions after 18 hours	Dextrose	gas + acid	gas + acid	gas + acid
	Mannite	gas + acid	gas + acid	gas + acid
	Lactose	gas + acid	gas + acid	gas + acid
	Saccharose	gas + acid	negative	negative
	Motility	not mobile	mobile	not mobile

The three strains were subcultured on Infusion agarslants, and 18 to 20 hour old cultures were used for the opsonic index test.

The following table shows the results obtained in this study.

Normal Pregnant Women				
Month of Pregnancy	*Para*	*B. Coli (hemolytic)*	*B. Coli (Non-hemolytic)*	*B. Coli (Keton)*
7½	I	96%	100	76
7	II	65	2	0*
4	VI	98	68	1
6—	I	3	1	0*
8	II	97	72	69
6½	I	35	0	5*
7½	II	100	20	10
6	I	0	0	0*
7	I	20	45	100
6½	II	42	92	80
7½	IV	78	90	88
7	II	56	100	100
6	II	100	64	32
8	I	57	91	88
8½	I	98	52	18
6½	I	70	75	86
5	II	98	96	88
7	II	94	98	76
8½	I	63	94	72
8½	I	100	51	40
1½	I	96	98	100
5½	III	98	52	81
8	II	84	88	48
8½	III	74	46	24
6½	I	76	40	40
5½	II	100	35	92
7½	II	79	90	81
7	I	86	97	56
8	I	90	98	80
5	III	85	90	67
9	I	60	84	48
7	II	86	98	98
9	I	96	100	98
8	II	78	98	70
9	II	4	0	0*
7½	I	96	70	58
6½	II	92	98	98
6	II	78	68	48
7	I	93	90	76
8	I	68	58	88
7	III	89	83	72
6½	I	65	48	61
7	II	94	90	92
8	I	92	89	72
9	II	48	68	96
9	III	96	64	98
9	I	96	78	100
9	II	94	72	100
9	II	81	42	78
8½	III	98	36	21
9	XV	98	33	62
7½	I	0	0	0*
7	III	20	100	42

Percentages indicate the proportion of leucocytes which take up the bacteria.

Thus it is seen from these observations that in 6 out of 53 pregnant women, a marked decrease in the immune reaction of the serum could be noted, as evidenced by a sharp fall in the opsonic index. These observations indicate that in about one woman out of every nine, conditions are present which would markedly facilitate the occurrence of infection. With regard to these statements, it is of interest to learn that Pugh recently found renal infection in nearly 10 per cent. of all the pregnant women he examined.

In the search for an analogy as regards the lowering of the resistance of the pregnant organism against infection, I could gather the following noteworthy data from the literature.

First, it is recognized that during pregnancy there is a lack of complement in the guinea-pig's serum. Similar conditions obtain in pregnant women as stated by us in a still limited number of cases. Dr. Bull, in a personal communication, informed me that last summer in his laboratory in the department of Immunology in the School of Hygiene, he noted in two instances a rapid lowering both in the agglutinins and in the complement fixation test in pregnant rabbits after immunization against the pneumococcus, and that the titre of the immune bodies returned to its initial level after the termination of labor.

In human pathology, there have been recorded in recent years a number of remarkable observations with reference to an alteration of the equilibrium of immunizing substances in pregnant women. First of all, Koessler and Neumann in their studies conducted in the Vienna clinic claim to have ascertained during pregnancy both a decided lowering and an instability of the opsonic index of the serum toward the tubercle bacillus. Moreover, Ed. Martin showed that the clinical tests with Pirquet's subcutaneous reaction and the ophthalmic reaction in pregnant women frequently reveal striking deviations from the usual results. Clinical and experimental data obtained by P. Bar in infectious diseases, (pneumonia, influenza, measles, tuberculosis) led him to conclude that the pregnant organism should be considered to be in a state of "passive anergy". Geller and Sommer, in a recent communication, claim to have established a decrease in immunity during the premenstruum.

As regards the possibility of a change in the local resistance of the tissues of the upper urinary tract in pregnant women, no information is available. Therefore, it may be worth while to dwell for a moment on a new aspect of the problem relative to the local conditions of the renal pelvis. While studying the finer histological details of that region during gestation, when the renal pelvis was distended, there could be seen, on microscopic examination, an aggregation of both lymphocytes and mononuclear cells of the macrophage type, within the submucous layer and sometimes even in deeper zones of the connective tissue. Our findings may be summarized by stating that they are identical with the protective mechanism which we demonstrated as a constant feature in the parametrium during pregnancy and labor, and which is characterized by the presence of clasmatocytes and monocytes. Lawrence S. Kubie has recently demonstrated that a similar mechanism develops in the meninges in response to injuries. Moreover, whenever small areas of emigrated red blood cells had made their appearance in the connective tissue of the renal pelvis, the phagocytic action of the macrophages could be demonstrated by the presence within their cytoplasm of well preserved or disintegrated erythrocytes.

For clinical purposes, it must always be kept in mind that, despite the presence of bacteria in the stagnating urine, the bacterial balance within the tissues of the renal pelvis is well preserved so long as the local immunity provided either by the natural forces or by the vital activity of the phagocytic tissue is in operation. In order to set up inflammation, the invading bacteria must either be of a virulent type or they must have secured a foothold in the underlying tissues through a breach in the defending barrier; such a breach may be due to an overdistention of the renal pelvis. Moreover, reference should be made to the frequent occurrence of B. coli and other bacteria in the urine of healthy pregnant women. When one recalls that Ahlbeck, Falls, Koch and others have shown that an asymptomatic Bacteriuria exists in a large percentage of apparently normal women, and, furthermore, that varying degrees of ureteral dilatation occur in the vast majority of normal pregnant women, it becomes apparent that the lowering of the resistance of the organism, a lack of either general or local immunity, constitutes an important element in the development of inflammatory processes in the renal pelvis.

Clinical investigations clearly show that Bacteriuria and Pyelitis must be considered as closely related conditions, and there is good evidence to indicate that the Bacteriuria may antedate the development of pyelitis for months or years; and, on the other hand, that the Bacteriuria may persist without manifest clinical symptoms for a long time after the subsidence of the pyelitis. The clinical observation that the onset of pyelitis frequently occurs during pregnancy or coincides with the premenstrual period (Lenhartz, Schlayer, Scheidenmantel and others), still further impresses with the fact that individual variations in immunity must be considered important factors in the development of pyelitis.

AFTER-EFFECTS OF PYELITIS IN PREGNANCY

It is only recently that in a few institutions patients who have suffered from pyelitis in pregnancy have been followed up for months after the termination of labor. The results obtained have served to throw some light on the inadequacy of the treatment thus far employed.

In accordance with the ideas which guided our researches in the previous sections of this paper, it was deemed important to obtain information, if possible, concerning the structural changes which are likely to occur in the ureteral wall during the puerperium. For the solution of this problem, only a single specimen in our collection was available, and this was obtained at autopsy upon a patient dying five weeks after labor. Upon studying sections through the juxtavesical portion of the ureter and the trigonum vesicae, it was found that the complex structural alterations described above have almost entirely disappeared. Fibroblasts are no longer visible, mast cells and mononuclear cells are absent. The connective tissue layers show an approximately normal appearance, with the individual strands running in waves. Of special interest, however, are the conditions obtaining within the musculature. Here in certain areas strands of muscle fibers may be observed, which are quite normal in appearance both as regards their nuclei and the sarcoplasm; while in close proximity other bands of musculature present an indistinct structure, stain faintly and show a great diminution in the number of nuclei. Here and there a few vacuoles may be seen in the sarcoplasm. On the basis of these facts, it seems logical to conclude that during the puerperium processes of

involution occur within the urinary tract, closely paralleling those which take place in the uterine wall and were described in detail by Saenger, and by Broers. At the present time, an exact appraisal of the bearing of such findings upon the ureteric action following labor and during the puerperium, is impossible on account of lack of information. My search of the literature revealed but a single reference to the problem, and Kidd in his monograph stated that "the tone of the ureter returns very slowly after pregnancy".

With the object of determining the actual state of affairs in the upper urinary tract months and years after the termination of the pregnancy during which the patients had suffered from pyelitis, Drs. G. Gardner and J. K. Hoerner studied twenty-seven patients from our department. The length of time which had elapsed between labor and the revision of the conditions obtaining in the urinary tract varied from 4 to 33 months. In each instance, pyeloureterograms were made, and samples of urine taken separately from the bladder and from the renal pelves were subjected to careful bacteriologic and microscopic study. The records of these cases are presented by the following summary:

(1) In 9 of the 27 cases examined, the attack of pyelitis had occurred during the puerperium. In none of them on reëxamination was there found any persistence of the bacteria previously involved in the urinary infection; nor was a persistent dilatation of the ureters noticeable.

(2) Bact. coli had been cultured from the urine during pregnancy in 14 out of the 18 cases of pyelitis which were studied during pregnancy, and in 7 of them (50 per cent.), the persistence of the same bacteria was demonstrated in the renal pelvis when the patients were re-ëxamined.

(3) When the signs and symptoms of pyelitis developed during the last 10 days of pregnancy, no after-effects could be demonstrated in the urinary tract.

(4) On reëxamination a marked dilatation of the ureter was noted in 8 of the cases who had presented pyelitis during pregnancy,—an incidence of 44.4%. Likewise, a considerable dilatation, associated with the presence of a gram-negative streptobacillus was found 17 months after a spontaneous but prolonged labor in a primipara, who otherwise had been asymptomatic during the course of her pregnancy, except for some pain in the left side of the back during the last 4 months.

(5) When dilatation of the ureter was noted, it usually involved both the upper half of its pelvic portion as well as its abdominal course, a narrowing being noticeable between the two divisions just corresponding to the iliosacral junction.

(6) Upon studying the histories of the cases of pyelitis during pregnancy, it was found that some correlation can be established between the severity of the clinical symptoms—acceleration of the pulse rate, fever associated with chills, and increase in the white blood count—and the persistence of ureteral dilatation later on. Furthermore, the onset of pyelitis during the fifth to seventh month of pregnancy, and a rather protracted clinical course are conducive to a remaining atony of the ureter.

(7) It is a matter of no little interest, that in two patients the persistence of abundant white blood cells was noted in the kidney urine, while in one of them albuminuria still persisted a year after delivery.

Quite a few of the Pyeloureterograms obtained in this study clearly show ureteral dilatation beginning half way between the bladder and the pelvic brim, which is in full harmony with the findings of Corbus and Danforth, as well as those recorded by Loeffler in the Vienna clinic. In addition, the inference could be drawn from a few observations that a severe inflammatory process in the ureteral wall may definitely interfere with its involution and may favor stricture formation. A similar view has recently been advanced by Crabtree, who regards a severe inflammatory reaction in the ureteral wall as favoring stricture formation, and gives a detailed account of a case of pyelonephritis of pregnancy, in which the stricture developed within a year following pyelographic evidence of its absence prior to that time.

With the knowledge of the after-effects of pyelitis complicating pregnancy at our disposal, it becomes apparent that the condition can no longer be regarded as innocuous and, furthermore, that our present treatment falls far short of being ideal. Bearing in mind that the presence of an inflammatory process in the urinary tract may essentially interfere with the involution of the ureteral wall during the puerperium and, in addition, may even favor stricture formation, our first therapeutic concern consists in combatting the inflammation. Pointing in the same direction, it should always be borne in mind that in pyelitis of pregnancy there is usually a definite lesion of the kidney parenchyma (F. Kidd, W. S. Pugh, Knaak and others), and that albuminuria may occasionally persist as a legacy of the disease. With the clinical evidence at hand that protracted ureteral distention is attended by an insufficiency of ureteral peristalsis, the latter should be considered as one of the main factors in the production of pyelitis in pregnancy, so that the establishment of free drainage of the upper urinary tract represents one of the chief requisites of successful treatment. Consequently, every effort should be made to restore, if possible, the efficiency of ureteric action and, by so doing, to do away with the atony and dilatation.

It is with these thoughts in mind that we looked for drugs which might relieve congestion and inhibit exsudation in the ureters, and at the same time stimulate their action. In this respect, pituitary extract strongly commends itself, as it exercises highly specific effects in both directions. According to the experimental work of Leif T. Poulsson, the development of inflammatory

processes may be checked by its administration, while its consolidating effect upon the capillaries is shared only by adrenalin (Auer and Meltzer, Exner, Tainter and Hanzlik).

Furthermore, from recent observations made both in clinical practice and by means of X-rays, there is definite evidence at hand to show that an injection of a half cc. of pituitary extract produces, after a brief period of relaxation, vigorous peristaltic contractions of the ureter (Kalk and Schoendubbe, Boeminghaus, Mackersie, Rothman). In addition, the effect of pituitary extract on the urinary tract in general is amply indicated by its stimulating action on the atonic bladder musculature of the puerperal woman, as first observed by Hofbauer in 1911, which served as an inspiration to apply these facts in our practice in the hope of stimulating ureteral contractions and thereby doing away with urinary stasis in pyelitis during pregnancy. All that I can say at the present time is that in a small number of such cases relief of the subjective symptoms, as well as a drop in the temperature was distinctly noticeable soon after this drug was repeatedly given. Bearing in mind that persistence of ureteral dilatation associated with ureteral atony constitutes an important feature of the after-effects of the disease, the administration of pituitary extract for a certain period of time after the termination of pregnancy is recommended in an effort to restore, if possible, the normal shape and efficiency of the ureters. Whether such an artificial massage of the urinary tract in the post-natal care of patients suffering from pyelitis complicating pregnancy will actually prevent permanent structural damage, is yet to be ascertained. It will be made the subject of further investigation, along with a study of the effect of hypertonic solution of glucose on the bactericidal power of the blood in cases of pyelitis during pregnancy.

During the attack of pyelitis no antiseptic drug should be used on account of the possibility of renal involvement. Lactose, on the other hand, known as the most effective carbohydrate in checking intestinal putrefaction, is now freely given in our service during the febrile period of pyelitis complicating pregnancy.

SUMMARY

Urinary obstruction in pregnant women is caused by certain anatomical conditions in the juxtavesical portion of the ureter and in the trigonum vesicae.

Hypertrophic changes in the musculature associated with hyperplastic changes in the connective tissue are essential factors in the narrowing of the lumen of the lower part of the pelvic portion of the ureter. The constriction is still further accentuated by an encircling ring resulting from hypertrophy of the ureteral sheath, while engorgement of the vessels in the mucosa and dextrorotation of the uterus may act as contributory factors.

There was no demonstrable indication of an active inflammatory process or of remnants of a preceding inflammation in the ureteral wall in the specimens examined.

A moderate degree of hydroureter is a common occurrence in pregnant women. The distal end of the ureteral dilatation usually lies at the level of the parametrium, the visible dilatation being associated with a demonstrable delay in ureteric action. The hyperplastic and hypertrophic changes in the upper pelvic portion and in the abdominal portion of the ureter are decidedly less marked, and the dilatation above the narrowed area of the juxtavesical portion occurs as a consequence of the structural peculiarities described in this paper.

The hypertrophy of the trigonum accounts for the clinical phenomenon of residual urine in pregnant women.

In 6 out of 55 cases a definite lowering of the opsonic index of the serum toward B. Coli during pregnancy could be demonstrated. The bearing of these findings on the development of actual pyelitis is discussed.

Histologic evidence tends to substantiate the occurrence of involution processes within the ureteral wall, in analogy with the phenomena occurring in the uterus during the puerperium.

While there occurs after labor a gradual return of the renal pelvis and of the ureter toward normal in uncomplicated cases, persistence of both bacteria and of marked dilatation of the ureter is demonstrable on reëxamination in a considerable percentage of women who had been treated for pyelitis during a preceding pregnancy. In the vast majority of these cases, the level above which the ureter has remained dilated corresponds to the parametrium. Stricture of the ureter may occasionally result from longstanding infection in the ureteral wall during pregnancy.

The inadequacy of the present therapeutic measures calls for radical changes in the treatment of pyelitis complicating pregnancy. The use of pituitary extract is suggested on account of its specific inflammation checking action, as well as for its stimulating effect upon ureteric peristalsis.

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Discussion

Dr. J. Dellinger Barney, Boston: I am sure you share with me the belief that we have listened to a very stimulating paper. In order to have more light on the subject we have invited several distinguished men from Boston to hear the paper and take part in the discussion.

Dr. L. E. Phaneuf, Boston: I want to thank the Urological Association for the privilege of hearing Dr. Hofbauer's instructive and interesting paper. I have been especially impressed with his description of the ureteral changes in the different locations, close to the bladder and elsewhere, and with the etiology of this condition which previous to his work was more or less obscure.

Clinically we meet pyelitis of pregnancy very frequently on the average obstetrical service. The family physician gets disturbed by the high temperature accompanying the lesion,—temperatures up to 105 or 106. These cases are immediately referred to the hospital. Fortunately the mortality in this condition isn't high in my experience. On looking over the records of the Carney Hospital I find we have had no mortality.

The treatment in the past has been conservative. We have treated most of our cases ultra-conservatively. Of late the use of the in-dwelling catheter has been recommended to drain the ureter and to drain the pelvis of the kidney. The value of this method is emphasized by the etiology, as defined by Dr. Hofbauer, for it dilates the constriction caused by the hypertrophy of the periureteral sheath. The old treatment has consisted largely in the use of urinary antiseptics, large amounts of water, rest in bed and good nursing.

We haven't used the in-dwelling catheter although we have been fortunate at the Carney Hospital in calling on Dr. Graves for help in these cases. We did have one case last spring which wasn't doing well and in which Dr. Graves felt this might be advisable. We postponed it for 24 hours, and the plug was expelled during the night as the patient's temperature fell to normal the next day.

I thank you for the invitation to hear this interesting paper.

Dr. Tracy B. Mallory, Boston: Dr. Hofbauer's paper is on such a completely new field to me that I do not feel I have anything to offer except possibly to ask him two questions. He has given us very clear evidence of the hypertrophy of the muscular tissues in the juxtavesical portion of the ureter. I was wondering whether in addition to that there was any evidence of spasm of that particular portion of the muscle.

The other point that interested me was the return to the old method of opsonic index studies as a method of judging the immunity of patients. It was a method that was in great favor twenty years ago and then through the difficulties of technique had been almost entirely dropped in recent years. The immunity to bacillus coli can probably be measured better in that way than in any other. I believe the method was wisely chosen and the results are certainly very interesting.

Dr. E. Granville Crabtree, Boston: I want to add my congratulations to Dr. Hofbauer for bringing detailed work on one of the phases of renal retention in pregnancy. His work clears up a certain number of facts and brings out the realization that definite changes do take place in the ureteral wall in its lower portions during pregnancy.

There is one outstanding fact against the view that these ureteral changes constitute the entire causal factor in pregnancy. It is the promptness of febrile recovery following the interruption of pregnancy. Were the condition entirely due to ureteral wall change, with or without the spasm which Dr. Mallory has mentioned, it is not probable that such prompt recovery would take place. Some further explanation must be forthcoming to explain this promptness of recovery. Perhaps Dr. Hofbauer can answer, or at least elaborate, his theory on that point.

Other changes in the patient due to pregnancy must be considered, one of which is the angulation of the ureter from the pregnant uterus situated beneath the base of the bladder for a certain portion of the pregnancy. Also tremendous blood vessel changes along the course of the ureter take place. Whatever significance these vessel changes are capable of in embarrassment of drainage through the ureter must eventually be worked out. I make these statements without intending to belittle the importance of Dr. Hofbauer's work.

Ureteral hypoplasia is welcome evidence on

the possible causes of ureteral obstruction in pregnancy. Not all of the members of this Association are obstetricians, or intimately associated with obstetrical cases. I think it might be well to refresh your memory on renal and ureteral changes which take place in pregnancy, particularly in the light of the pathology which has just been shown. Infection will surely take place, accompanied by ureteral and pelvic dilatation, in kidneys which presumably were normal preceding pregnancy, because they return to normal at the termination of pregnancy.

I am showing you in this X-Ray, taken during pregnancy, such a case. I believe those observers to be wrong who contend that pyelitis of pregnancy occurs only in the abnormal kidney. The characteristic appearance as you see in this plate is a dilated pelvis, dilatation of the upper portion of the ureter and redundance of the ureter in its upper portions. You will also note that where the catheter has been withdrawn and the ureter injected in the lower portion of the cross of the ureter, the lumen is that of a normal ureter.

It has been mentioned that regurgitations frequently take place in pregnancy. We have found such instances of regurgitation of fluid into the ureter on one or both sides in what seems to be a percentage beyond the normal seen in the non-pregnant. We have not yet sufficient figures to allow of a definite statement. The point at which dilatation begins is not always as shown in the pyelogram. In some instances dilatation extends into the lower portion of the ureter even as far as the bladder wall. Not always does it seem advisable to do pyelograms on sick cases that this evidence might be obtained, but one gets a great deal of cystoscopic evidence to substantiate this view. By cystoscopic evidence I refer to determination of the point at which the pelvic type of flow is obtained in the ureter, and the point at which by suction large quantities of fluid can be withdrawn.

Not always does infection take place in previously normal kidneys. This pyelogram shows a previously existing abnormal kidney infected during pregnancy. This patient had no symptoms, but a mass in her side had been known to exist since infancy. When she appeared at the Lying-In Clinic the large abdominal mass was thought to be a large cyst situated well above the uterus. In the later weeks of pregnancy infection of this hydronephrotic kidney took place. Following delivery, which was uneventful except that the patient was quite ill from urinary infection, drainage of the hydronephrosis was first done, and a secondary nephrectomy under local anaesthesia later performed. The extent of the dilatation can be seen from the pyelogram in which only partial filling of the kidney has been done. Following removal, and when distended to its capacity, the kidney had 14½ inches in length and 8½ inches in diameter, corresponding in appearance to a section of an oversized balloon tire.

Certain of these cases in which infection takes place in a previously undamaged kidney undergo a slow return to normal. In one instance, in which cystoscopic observation was checked by pyelogram, the patient passed through a period of three years before the pelvis returned to normal from its extensive dilatation. Previous to that date injection of 10 to 15 c.c. of fluid could be made producing a pyelographic picture consistent with a normal pelvis, but if distension was increased to 30 to 40 c.c. it was done without pain, and the pyelogram had the appearance of a hydronephrosis. At the end of this period distension beyond 12 c.c. produced the characteristic reaction of over-distending a normal kidney. In the Lying-In Hospital Out Patient Clinic our experience has led us to expect that over-distension due to pyelitis of pregnancy will disappear and the urine become bacteria free within approximately six months following delivery.

I wish to emphasize that in deductions drawn from pyelograms taken previous to this date they are apt to be erroneous as to the amount of damage existing in the kidney.

I wish to show a few pyelograms taken remotely following delivery in cases in which typical pyelitis of pregnancy changes had been present during pregnancy. Dilatations in these cases were not extreme in amount, varying between one and three ounces during the febrile stage of the infection. I wish also to point out that in those instances in which overdistension of the kidney pelvis is of many weeks' duration, the patient frequently shows permanent damage to the kidney.

This film shows the pyelograms of the patient in whom X-Ray at the Massachusetts General early in her pregnancy showed the presence of a normal kidney and the absence of stones. The bilateral pyelitis proved very troublesome and persisted for eleven weeks. Dilatation of one of the pelves at one time was more than three ounces. During the year that has elapsed since her delivery both pelves still show hydronephrosis and stones are forming in her hydronephrotic kidneys. I think it fair to state that as a result of long-standing pyelitis of pregnancy, permanent dilatation of both kidney pelves in which stone formation is taking place has resulted. During the past seven years at the Boston Lying-In Hospital calculus formation has frequently resulted in patients who had long-standing pyelitis during pregnancy.

It is not unlikely that future data will show eventual loss of kidneys in women to be the result of initial damages which had their beginning in pregnancy.

A few words more on the purely clinical side of pyelitis of pregnancy. There has been no known case in the Boston Lying-In Hospital in the past seven years in which we found recovery from infection to have taken place during pregnancy. Occasionally the urine will clear to a bacilluria which persisted throughout pregnancy. In some instances, particularly in the

last weeks of pregnancy, such a patient will again show cloudy urine and the onset of fever symptoms. This we attribute to change of position of the fetus preceding the onset of delivery. I have no doubt that acquired immunity protects these patients and allows them to handle the remnants of infection after the acute symptoms have subsided. Furthermore, in those patients which have acute symptoms, the contents of the pelvis is considerably larger then than the same pelvis in the quiescent stages of the disease previous to delivery. As an example, in one patient during the acute stages the right pelvis contained 116 c.c. of urine; several weeks following the subsidence of the fever and while the patient was free from symptoms of any kind, cystoscopy showed that the same pelvis contained but 15 c.c. of cloudy urine.

I have no doubt that bacillurias are extremely common in pregnancy. The only statistics available from the Boston Lying-In Hospital acquired some years ago, showed that of 200 cases existing, 32 instances of bacilluria were found, two of these cases developed pyelitis symptoms in the course of the pregnancy.

I have not tried the use of pituitrin as a stimulant to the muscle structures of the pelvis and ureters. I wish to thank Dr. Hofbauer for the suggestion.

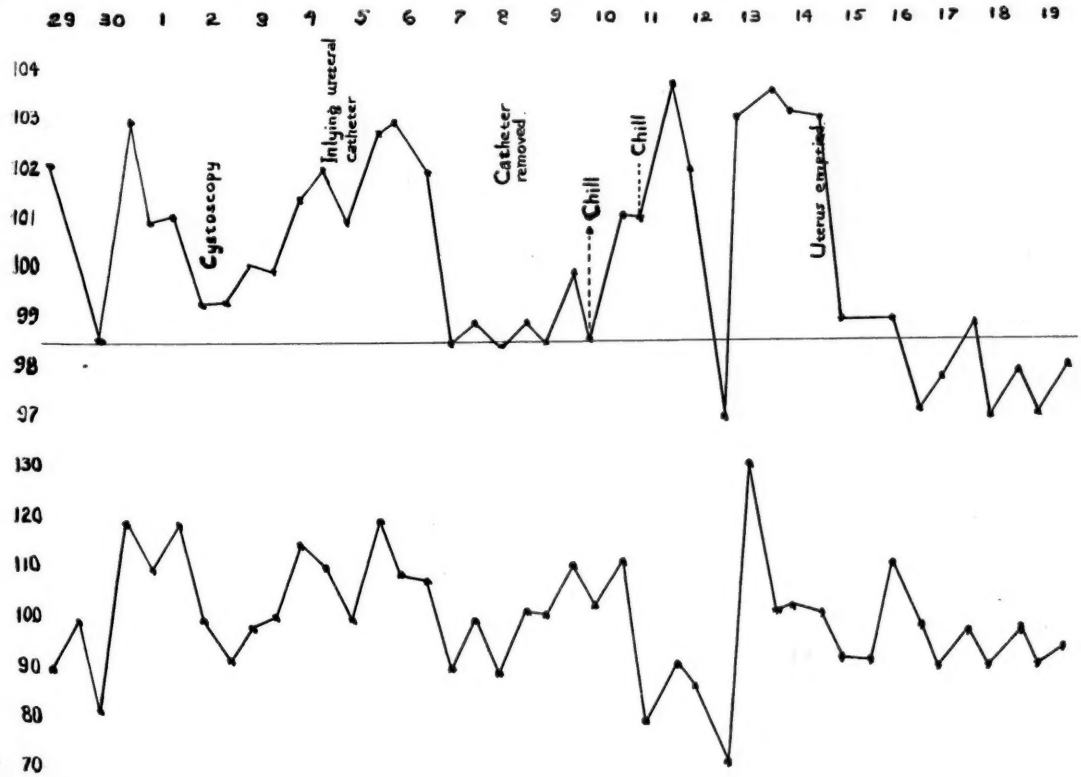
We are strong believers in the advisability of early cystoscopy treatment in this disease, believing that reduction of overdistension and the clearing of a pelvis clogged with pus definitely hastens recovery, over the cases in which only expectant treatment is employed.

Dr. Frederick C. Irving, Boston: We have had the opportunity of listening to a very ingenious explanation concerning at least one of the etiological factors of pyelitis of pregnancy; and it seems to me there is a great deal of food for thought in what Dr. Hofbauer has told us.

In conjunction with Dr. Crabtree at the Lying-In Hospital we see a fairly large number of these cases, and I thought you would be interested to know how frequent this condition is. In the last five years, from 1923 to 1927 inclusive, there were 9,209 admissions, and of these there were 204 admissions which had pyelitis—an incidence of about one in 45. In an institution of this kind a certain error creeps in, namely, that some cases are sent in from the outside because they have pyelitis and not because they are pregnant. In these 204 cases there were seven in which we found it advisable to terminate pregnancy. The others recovered as the result of measures which included the use of urinary antiseptics, rest in bed and forced fluids, or cystoscopy or cystoscopy plus the indwelling ureteral catheter.

It seems that drainage is the important thing in these cases. Where drainage is established we may expect to have relief of symptoms.

I have a copy of a temperature chart I would like to show because it illustrates in one and the same patient the result of cystoscopy, which was unsuccessful, the result of ureteral drainage which was excellent until the patient pulled the catheter out, and finally the result of emptying the uterus which cured the patient or enabled us to discharge her from the hospital with a normal temperature (showing chart). The upper



curve is the temperature curve, and the lower curve the pulse curve. She came in with a temperature of 102 and with a pulse of 90; and the next evening her temperature went up to 103, and her pulse to 120. At this point she was cystoscoped and had a lavage of her kidney pelvis. That resulted in very little change. So three days later she was again cystoscoped, and an in-dwelling ureteral catheter put into her kidney pelvis. Two days later her temperature dropped to normal and remained so until at the point when she pulled out the catheter her temperature went up, and she had two chills. At this point on the chart her uterus was emptied, the temperature dropped to normal and continued so up to her discharge.

There were several instances where urologic treatment failed and where the condition of the patient was such that in order to save her life we were forced to empty her uterus, and in each one of these cases there was a prompt recovery.

Of course, this indicates, as Dr. Crabtree says, that in addition to Dr. Hofbauer's hypothesis regarding the increase of the constricting bands of the ureter the pregnancy itself must have something to do with it. There is no reason why these patients should have recovered so promtly if the pregnancy had not been at the back of the thing.

Now the question that comes up is—Are there not certain cases in which we might save some of our patients a long convalescence or a long illness later on if we were willing to empty the uterus earlier than we do? There are so many in after years who have infection persisting and have stones that it makes us think we would have done better if in these cases we had emptied the uterus earlier than we do at present.

Dr. James L. Huntington, Boston: I have nothing to say. I enjoyed the paper very much.

Dr. Frank A. Pemberton, Boston: It occurred to me that if Dr. Hofbauer's explanation is the fundamental one, pyelitis ought to be bilateral. I do not know whether it is or not.

Dr. Roger C. Graves, Boston: I have been very much interested in Dr. Hofbauer's paper. New work is always stimulating whether or not it tells the whole story. It seems to me that this paper has been very well presented and that it certainly throws new light on the etiology of pyelitis in pregnancy. It has been interesting to have a suggestion advanced as to the cause of the temporary hydronephrosis which takes place so frequently in pregnancy and to find in that suggestion something beyond the mere passive pressure of the pregnant uterus upon the ureters. It has always been difficult for me to accept the view that anything so physiological as pregnancy can produce anything so pathological as ureteral obstruction. I find it easier to believe that the bladder may be confronted with an added burden as the growing uterus encroaches upon it in increasing degree during the pregnant state. That there may be some measure of interference with bladder emptying, moreover, would seem to me to be the logical conclusion of Dr. Hofbauer's anatomical arguments. Muscle hypertrophy is a response to a demand for increased effort. Hypertrophy of the distal ureter, therefore, together with the changes in the trigone and the urethra, points towards a compensatory development in pregnancy to cope with mechanical difficulties which center in the bladder and not in the ureter. With this thought in mind I wish Dr. Hofbauer had told us more with reference to the changes in the musculature of the bladder wall itself.

The theory of the specific lack of immunity which these women present is exceedingly interesting to us who have long considered urinary infection as the result of the coincidence of bacteria and some urinary stasis. On the evidence offered, we must revise our opinion in this instance and look for an additional factor that we haven't reckoned with—namely, some specific lack of resistance in the individual at this particular time.

Dr. A. L. Chute, Boston: I have very little to say about pyelitis in pregnancy. I want to thank Dr. Hofbauer for the new point of view he has given us. I should, however, want to think it over and study it more before I accepted it in place of the simpler idea that the cases of "pyelitis of pregnancy" were simply recrudescences of infections which had existed before, or new infections taking place in a pregnant woman, whose resistance is less than that of the ordinary person and which causes the process to run a more virulent course and which had special features because of the pregnancy rather than because the disease itself was different from the cases of pyelitis that we so often see in women.

Dr. John W. Keefe, Providence: I know I cannot add anything to what has been said. I do feel that it is time we had men like Dr. Hofbauer who are willing to do work of the character he has shown us tonight; and not only has he given us something new to think of but the fact that he has given us the remedy, in pituitrin, which may be of distinct value to these people who are ill, makes his work of greater value.

We often look to something mechanical which might produce obstruction, but we know that infections are carried through the blood stream, and may be carried from remote parts of the body to the kidney, the ureter and bladder. From my own experience and from what I have read I feel that the infections are not always due to mechanical causes.

I have also felt that catheterization of the ureter on women who are as ill as these women are, might be attended with some danger from the trauma from the catheter and it seems it

might be wiser to force fluids and not run the risk of damage by catheterization of the ureters. But the use of pituitrin which Dr. Hofbauer suggested, impressed me very much.

Dr. James A. McCann, Providence: I would like to discuss this paper from another view point—I think we are apt to take a series of cases that have complained of pain, pus in the urine, etc., and perhaps examine those cases carefully, but I believe it is rather daring to take a series of cases for three months and to cystoscope almost routinely. Such a procedure necessarily calls for adverse criticism. We did that on one of our services, and it was appalling what a number of genitourinary lesions were found without apparent symptoms; and as Dr. Chute says, in a great number of these women who suffer from pyelitis in pregnancy we knew nothing of their genitourinary tract before they were pregnant. If we had any idea of their genitourinary system before pregnancy we perhaps would have found lesions in these apparently harmless cases.

I think the doctor's report of this hyperplasia of the lower ureters is very interesting but I personally would be rather slow in accepting the idea that hyperplastic obstruction to the ureter is by any means one of the chief causes of pyelitis in pregnancy although it may be a predisposing one.

Dr. H. F. Brownlee, Danbury, Conn: I have been interested in this condition at Danbury where we have had in the last few years probably a dozen cases of real definite pyelitis. In none of those cases have I been able to discover any obstruction in the ureter. We could pass a catheter into the pelvis of the kidney in every instance, and we have treated them with drainage and lavage without any deaths. It seems to me it isn't an obstructive thing but something more that applies to a woman's pregnant condition or something she had before, but not obstruction. I don't think every pregnant woman should have her ureters catheterized but I haven't seen any harm from those we have done.

Closing Discussion—Dr. J. I. Hofbauer: The focus of infection in pyelitis complicating pregnancy is very probably the intestinal tract. We succeeded in demonstrating a loosening of the submucosa of the small intestine in the pregnant woman. In addition, it has been shown by Dr. A. Lloyd of Chicago that in pregnant animals, due to some lack of secretion of gastric juice, there may be present in the higher parts of the small intestine a flora resembling the flora of the cecum. A decrease in the secretion of hydrochloric acid is a frequent concomitant of pregnancy in human. Due to the enlargement of the uterus the cecum is pushed upward and may come in close contact with the right kidney pelvis.

When I presented a preliminary report of our work to the American Gynecological Society in May, 1927, I was much pleased to learn that Dr. DeLee has used pituitrin with gratifying results in a number of patients in whom the ordinary treatment of pyelitis had failed.

I heard Dr. Peterson, of Ann Arbor, report a case in which the ureter had been implanted in the intestine, and the edema which developed following the implantation was promptly relieved by the administration of pituitrin.

As far as Dr. Mallory's question is concerned it might be of interest to learn that during the last few years there has been advanced conclusive evidence to show that the bile ducts in the pregnant woman are in a state of higher irritability as evidenced by the fact that no bile could be obtained when a duodenal tube was introduced preceded by an injection of pilocarpine; in other words, we have to deal during pregnancy with an hypertonic Oddi sphincter, and the ureter may likewise be in a state of higher irritability, as far as its lowest portion is concerned. The patency of the ureteral orifice, as frequently seen in pregnant women upon cystoscopy, might be accounted for in that way.

As to the promptness of recovery after the uterus has been emptied, both the hyperemia and the edema of the mucosa of the ureter are known to disappear shortly afterwards. In addition, the ureter is no longer angulated. And the same holds true of the relief of symptoms sometimes seen after the patient has been put in Trendelenberg's position.

Dr. Irving spoke about the interruption of pregnancy. I share his opinion that we must be more liberal in interrupting pregnancies in severe cases of pyelitis on account of the developments of persistent after-effects both in the ureter and in the kidney pelvis.

One of the speakers wondered why nature would jeopardize the pregnant woman. This objection may be met by calling attention to gall-stone formation as a sequela of pregnancy.

In about 85 per cent. of all women suffering from gall-stones the formation of stones can be traced back to pregnancy. We have tried to find evidence of changes during pregnancy, in the liver and bile duct that may predispose to the formation of gall-stones apart from the higher content of cholesterin in the blood.

In conclusion, I want to express my thanks to the Association for the hearty interest accorded my paper; and if our investigations stimulate further research on the subject, the work will have achieved one of its objects.

THE PRESENT STATUS OF THE TREATMENT OF GENITAL TUBERCULOSIS IN THE MALE*

BY J. DELLINGER BARNEY, M.D., F.A.C.S.†

ONE of the three topics chosen for discussion at the 3rd Congress of the Societé Internationale d'Urologie, held in Brussels last August, was "The Treatment of Genital Tuberculosis in the Male." K. M. Walker of England, Gamberini and Marogna of Italy and the present writer were the reporters. In the preparation of our papers we all had occasion not only to review the entire literature of the question, but also to draw upon our own experience as well as upon that of our colleagues. It would seem, therefore, as if a composite review of these three latest contributions to the literature would give a fair cross section of the opinion of the world on the treatment of male genital tuberculosis.

In spite of, perhaps because of, all the investigation that has been done both by laboratory workers and clinicians, it is found that there are still two distinctly different points of view, one that genital tuberculosis originates in the seminal vesicle or prostate, the other that the disease originates in the epididymis. So plausible and well grounded are the arguments set up on each side that the uninformed but intelligent reader will sometimes be at a loss to decide which theory is correct.

It is, however, unanimously agreed that genital tuberculosis is always secondary to a focus elsewhere in the body, this focus often being healed or quiescent and antedating by many years the lesions of the genital tract.

It is also true that with certain exceptions, the information gained at the autopsy table is misleading or of little value for the reason that such cases are generally in an advanced state of tuberculosis and the entire genital system, sometimes also the urinary system, is involved. The difficulties of deciding which is the ancient and which the recent lesion are often insurmountable. In one of our own cases postmortem examination showed an invasion of almost every organ in the body but the prostate; on the other hand Young, Guyon, Simmonds and others, have reported several cases wherein the prostate and vesicles were alone involved. These observations are not only contradictory, but also suggest that primary prostatic tuberculosis, which up to now has been regarded as exceedingly rare, may be more common than we have supposed. It is a fact, however, that less than a dozen proved cases of primary prostatic tuberculosis are to be found in the literature. If they are so common as the statement of Young and others would imply it seems impossible to believe that the clinician watching a suspected case for a long period of time and perhaps finally operating upon it, would not have many more cases to report.

All writers agree, however, that in the presence of tuberculous epididymitis the incidence of prostatitis and vesiculitis is exceedingly high. On the other hand while genital tuberculosis may attack the infant or the old man it is a fact that before the age of puberty the prostate and vesicles are rarely affected. Not only is this true at the time of operation, but also in following up these juvenile patients one is struck, not only by the fact that no demonstrable involvement of the prostate and vesicles has appeared since operation, but also that which may have existed at the time of operation has retrogressed to the point of clinical cure. The crux of the situation is that no one has yet been able to study the pathology of the living to the extent of determining where the tuberculous invasion first started. Furthermore, in spite of careful, patient and ingenious experimental work the results are confusing and conflicting not only as to the paths travelled by the tubercle bacillus, but also as to their direction. Many authorities believe that the disease travels only in the direction of the secretory stream; others, whose opinion is equally trustworthy, maintain that bacilli travel contrary to this stream. Most investigators admit, however, that certain phenomena can be explained only on the ground that the bacilli are blood borne. It has also been shown that the genital organs, like the kidney, can excrete tubercle bacilli from the blood stream under certain conditions.

Those who hold the view that tuberculosis first attacks the epididymis explain its spread to the prostate and vesicles by way either of the canal of the vas deferens or the lymphatics surrounding this structure. Those who believe that the primary focus lies in the prostate and seminal vesicle believe that the bacilli reach the epididymis either through the deferential canal by means of a reversal of the normal peristalsis (a phenomenon which may occur under certain circumstances) or through the lymphatic channels in a direction opposite to the normal secretory flow. This also has been shown to be possible.

K. M. Walker's observations on this point are of interest. He cites Blandini's experiments showing that if organisms are placed in the posterior urethra of a guinea pig they can be recovered from the epididymis in 12 hours. In 1912 Walker repeated these experiments using B. Prodigeosus. If he tied off the vas deferens

*Read at the fifty-second meeting of the New England Urological Association held at the Harvard Club of Boston, January 16, 1928.

†For record and address of author see "This Week's Issue," page 466.

previous to the injection of bacilli they still reached the epididymis, provided that the ligature did not include the sheath of the vas or any of the lymphatics running in the cord, but if the sheath of the vas and surrounding lymphatics were tied few or no organisms could be obtained from the epididymis on that side. These results suggested to Walker that dissemination occurred through the lymphatics, a point which he demonstrated by using Gram positive organisms, such as staphylococci and examining cross sections of the cord and vas especially stained to show these organisms in the tissues. Walker has more recently repeated these observations in the human, using for material cases dying a few days after prostatectomy. He points out that in these cases there is always to be found a septic focus in the prostatic cavity which swarms with organisms. He removed the entire genital tract, cut multiple sections of prostatic capsule, seminal vesicles, cord and epididymis. By using appropriate stains he satisfied himself that "a widespread dissemination of organisms took place through the lymphatics." The lymphatics surrounding the vas were crowded with organisms but few or none could be demonstrated within the lumen of the vas itself. Walker's studies do not, however, explain the well-known clinical observation that whereas both ends of the vas deferens are thickened and nodular the middle third is frequently but little if at all affected. He says that the thickening found at the bladder end of the vas marks the lymphatic track along which the bacilli spread. On reaching the lower pole of the epididymis a favorable soil is encountered. From the focus thus found a secondary wave of infection begins by the breaking down of the nodule and the passage of its infected material into the lumen of the vas. In other words, there is a descending wave along the peri-deferential lymphatics and an ascending wave through the lumen of the vas. But in my opinion this theory while ingenious does not explain the conditions found. If transmission of bacilli is by way of lymphatics and if these lymphatics parallel the vas for its entire length why should certain parts of it share in the infection more generously than other parts? I have seen no adequate explanation nor have I one to offer.

All writers agree on the extraordinary frequency and early date of involvement of the second epididymis. It is also generally recognized that removal of a diseased epididymis will retard or prevent the appearance of the disease on the opposite side. It is probable that by removing this important source of infection the already infected prostate and vesicles become less active and, therefore, less likely to spread the disease. It has also been shown that ligation, or better, resection of the vas deferens on the opposite and apparently healthy side will generally prevent the appearance of tuberculosis in that epididymis. This happy result seems to favor the view of Walker that the infection spreads from the prostate by way of the peri-deferential lymphatics. If, on the other hand, tuberculosis should appear in the supposedly healthy epididymis after ligation of its vas (as it sometimes does) one can ascribe this to, (a.) already existing but undemonstrable infection of the organ, (b.) failure to occlude all of the lymphatic channel between prostate and epididymis, (c.) a hematogenous transmission of the bacilli.

In fact, the proponents of the epididymal origin of the disease must believe either that the second side becomes involved by way of the blood stream, or they must ascribe the infection to a deferential or lymphatic transmission from the prostate in either case assuming that tubercle bacilli are carried in a direction opposite to that of the normal secretions.

These, then, are the chief points of interest which years of careful and varied investigations have brought out. It is obvious that the problem is not yet solved and equally obvious that the weapons of one camp are helpful in certain circumstances to those of the other. I share the view of the great majority that the epididymis is the first of the genital organs to be attacked by tuberculosis. But that there are undoubtedly certain cases in which the disease begins in the prostate or seminal vesicle is an admission which many years of careful study both of the literature and of the clinical side of the problem has forced me to make. My opponents, for the most part, find themselves in a similar attitude of generosity.

As to the treatment of genital tuberculosis there is much argument and disagreement. Order cannot be brought out of chaos in therapeutics until the confusions in etiology and pathology are cleared up. Roughly speaking treatment is divided into (a.) radical surgical, (b.) conservative surgical and (c.) non-operative or medical. All three methods of treatment must and generally do take into consideration the fact that genital tuberculosis is but a local manifestation of a general body condition and that the treatment is really a problem in immunity. As Walker aptly says, "rarely if ever can the knife completely extirpate the disease. However radical our operation may be some focus must remain behind either inside or outside the genito-urinary tract from which new invasions may take place and fresh organs become infected."

Young is the most ardent advocate of radical surgery but Whiteside, Quinby and a few others have shared his view. The radical operation removes epididymis, testicles (if involved), vasa deferentia, prostate and seminal vesicles. The entire genital tract may be removed with a mortality (in Young's hands) of about 4%. But no matter how radical the operation it cannot remove the focus in lung or bronchial lymph gland from which the genital process took its origin. Nor can it prevent the subsequent lighting up of this focus with the production of general miliary

tuberculosis. As a matter of fact the radical operation does not even do away with all of the discomforts to which these patients fall heir if we are to judge from Young's own statements. He speaks of three operated cases which "cannot be called well," two having bladder symptoms, another a vesical urinary fistula: one has a "troublesome urinary fistula" and "three have prostatic fistulae from which a few drops of urine escape during urination." Whiteside's experience has been even less brilliant. Quinby has reported, "excellent immediate results," while Sacco and more recently Dillon have attained satisfactory results in a few cases. None of these have been followed for any great length of time. The radical operation is unnecessarily mutilating and does not produce immediate or remote results which are better than those of conservative surgery.

Conservative surgery means, generally speaking, epididymectomy. It is the method of choice of the vast majority of surgeons. While formerly this operation included castration on general principles, this unnecessary procedure is done now only in the event of extensive invasion of the gland. Experience has shown that a considerable amount of tuberculous testicular tissue can be removed without endangering the immediate or remote viability of the remainder of the organ. The important point in epididymovasectomy is to divide the vas deferens well beyond the internal inguinal ring over the bony pelvis. No fistula will result if this is done, where as if the vas is divided at the top of the scrotum fistula is sure to follow. As to the ligation or resection of the opposite vas in the event that its epididymis is apparently healthy, no rule can be formulated. Most of these patients will prove to be sterile even if only one epididymis is involved and one is not, therefor, spoiling an already bad egg. The fact that such a procedure is likely to succeed in preventing a second epididymitis, that it adds but little if any possibility of complications and that it will not influence fertility, is a strong argument for its performance. As to the remote results of epididymovasectomy my experience and that of many others has shown beyond all doubt that they are satisfactory. While it is true that many patients ultimately die of tuberculosis, this untoward event can be ascribed to the extragenital foci left behind. Generally speaking they gain weight, feel well, are free from urinary symptoms, have no fistulae and are able to maintain their sex function even when bilateral castration has been done. The operative mortality in over 20 years has been only about 2%, all dying of general miliary tuberculosis. Furthermore, and this is a point of great importance, the prostate and vesicles which before operation have shown the usual nodularity, induration and enlargement have eventually and often quite rapidly retrogressed to the point of being clinically cured. Not only this but these organs have not in my experience shown any evidences of an exacerbation of the disease. In only two cases in an experience covering about twenty years and involving over 300 patients has the tuberculous process in the prostate progressed after operation. In my opinion this fact is, in itself, enough to prove that the primary genital focus lies not in the prostate and vesicles but in the epididymis. Otherwise one must believe that the removal of a secondary focus will bring about the cure or improve the condition of a primary focus. Such a proposition is against all surgical and pathological principles. Also it must not be forgotten that children with tuberculous epididymitis do not have prostatitis and vesiculitis.

Medical treatment, while it may involve a certain amount of minor surgery such as the opening of an abscess of the scrotum, makes use of x-ray, heliotherapy, ultra violet light and various sera, more especially tuberculin. As one reviews the literature one is struck by the fact not only that none of these measures alone is of real and certain value, but also that by their unwise or too prolonged use the favorable moment for surgical intervention may be missed. Also, as I have recently shown, early neoplasms of the testicle, beginning either in or in close opposition to the epididymis, may be mistaken for tuberculosis of the epididymis. I have seen this occur in three personal cases where subsequent operation showed the actual state of affairs. No one has yet reported any considerable number of cases treated by purely medicinal methods which have been carefully followed for any length of time. At the best, medicinal treatment can hope to influence the course of the local lesion only in so far as it can raise the patient's general resistance to infection by an improvement of his condition. No one will quarrel with the value of medical treatment intelligently carried out before, during or after conservative surgery, but I have no hesitation in condemning it utterly as the method of choice.

It goes without saying that every patient with genital tuberculosis should be treated for his general as well as for his local condition. This means that every resource which hygiene has to offer for the improvement of the tuberculous should be called forth. If, at the same time we perform, preferably under a local anesthetic, sufficient conservative surgery to free the patient from his primary genital lesions we shall be doing all that is possible to do.

After a rather long and careful study of the problems of genital tuberculosis in the male I can think of no question more difficult of solution nor one which will call forth more patience, ingenuity or long continued observation.

Discussion

Dr. A. L. Chute, Boston: Dr. Barney has been good enough to ask me to take part in the discussion of his paper, knowing that my views on the subject are absolutely opposed to his.

My feeling about urinary tuberculosis was

undoubtedy much influenced by my experience with surgical tuberculosis in general at the time when I was a graduate assistant at the Children's Hospital, where we saw so much bone and other tuberculosis going on to suppuration and yet finally getting well or at least healed, often with pretty good function. When I first saw these cases of genital tuberculosis, for the most part tuberculosis of the epididymis, there was no definite treatment laid down other than orchidectomy, which seemed to me too radical so that I became interested in seeing what the non-operative treatment of this condition would do. I found it was true that a large proportion of these tuberculous epididymes went on to suppurate and break down, but that one could safely leave them alone, that they would open themselves, much as a tuberculous abscess of the hip would open itself and then that they would finally scar down.

There was another point that influenced me in my attitude toward this condition and it was that I believed the tuberculous epididymis was simply a fringe, so to speak, of the tuberculous, genital process. I saw rather early in my experience with the condition one or two cases in which there was severe pain in one vas deferens that was followed by a process that was clinically a typical, tuberculous epididymis on the corresponding side; this led me to believe that the infection in the tuberculous process was by the same route as in the gonorrheal infection or that due to an inlying catheter. It seemed evident to me that the removal of the epididymes did not do away with the whole of the tuberculous process, even in the genital tract; that to put a patient in a hospital, who had some underlying tuberculous process that had been giving off bacilli in order that he might have an operation which was at most one of convenience, rather than of necessity, was not good surgery. Then, too, I have seen on several occasions, a very long suppuration follow the removal of a tuberculous epididymis.

It has seemed to me that the popularity of this operation was founded on a supposed similarity in the problems presented by tuberculosis of a kidney and that of an epididymis. The problems I believe are really quite different. So far as the ultimate destruction of the organs go, the conditions are the same but my reason for taking out a tuberculous kidney is that if it is allowed to remain, until its ultimate destruction has come about, the disease will almost surely extend to the bladder and there set up a process which once it becomes more than superficial will make the patient most miserable, demanding that he empty his bladder at short intervals for the rest of his life. It seems to me desirable to remove an organ that is practically doomed to destruction to avoid this probable calamity. With tuberculous epididymis the process can extend no further unless as sometimes happens, it involves the testis when epididymectomy would be useless.

I believe I am in agreement with Dr. Barney as to the use of the more extensive operation, the removal of the vasa and the vesicles. I believe the same arguments apply. First the process is secondary to some bronchial or mesenteric gland or some bony process, therefore we cannot hope to remove all the tuberculosis that the patient harbors; second, that in my experience the processes usually quiet down so that the patient suffers no more than moderate discomfort and sometimes none at all; that the danger of the process does not justify the extensive operation that is required to remove it.

I wish to thank Dr. Barney for his paper which I have enjoyed very much, though I do not agree with him in certain particulars.

DR. J. DELLINGER BARNEY, Boston (closing): Dr. Chute and I always argue this out on all occasions, but I think if Dr. Chute had followed these cases that have been subjected to epididymectomy and had seen them improve to an extraordinary degree in a short time after the removal of the epididymis, one or both, and felt the retrogression of the prostatic and vesicular condition after the removal of the epididymis, he would have to believe that it did them good, on the one hand, and also believe that the disease wasn't primary in the prostate but in the epididymis.

I would like to have him explain how the removal of the secondary focus quiets down the primary focus. I have seen it happen in these cases for years and have followed them not only by letter but by personal examination.

Dr. Chute speaks of the long persistence of the fistula from the stump of the vas. It is true if you cut off the vas at the place they cut it in the days when Dr. Chute was in the Children's Hospital, namely, at the top of the scrotum, a fistula will surely follow.

DR. CHUTE: I have seen them cut in the ordinary way.

DR. BARNEY: But if they are entirely removed from the scrotum and done according to the technique of Dr. Hugh Cabot and myself, that is by freeing them up in the inguinal canal and removing them through a counter incision in the skin opposite the internal inguinal ring, so that perhaps you get an inch of vas over the pelvic brim and there cut it off, we have yet to see a fistula. I am dating my experience back to 1913. In all the cases I have had in the hospital and in private practice I think Dr. Smith and Dr. Crabtree will back me up that we haven't had a fistula in the stump of the vas. This argues well for this operation where the vas is cut off above the pelvic brim at a point where it is but little affected and where, after dividing it, it is buried to a considerable depth. So we

do not subject the patient to the annoyance of a fistula.

I have had occasion to remove the testicle only three times after orchidectomy where the testicle was tuberculous at the time and part of it was removed, and the remaining tissue couldn't overcome the disease that was left: in other words, you can leave a good part of the testicle behind knowing well that there is tuberculosis in it but this will always become inactive.

I think there is no argument as to the desirability of the conservative operation, but I do feel strongly in regard to the medicinal treatment which Dr. Chute advocates. This conservative surgery is done practically always under novocaine locally. We have had only four cases die at the Massachusetts General Hospital in a series of over 300 cases, and those that died had general miliary tuberculosis. So you see it isn't an appalling mortality, and I think the medicinal treatment would show no lower mortality.

End of discussion.

DR. A. L. CHUTE: I move a vote of thanks to Dr. Hofbauer for coming on and giving us a most admirable paper.

Motion seconded. All present rise.

Adjournment.

BOSTON DOCTORS ATTENDED CONFERENCE IN WASHINGTON—Dr. Robert L. DeNormandie and Dr. Richard M. Smith attended the fifth annual conference of State directors of maternity and infancy work which began its deliberations April 2, 1928.

The conference convened at the Children's Bureau.

The especial topics under consideration were infant and pre-school child problems.

Massachusetts, Connecticut and Illinois are not accepting financial aid under the maternity and infancy act.

Dr. DeNormandie presided over the opening session. Dr. Elizabeth Gardinio, Director of the Division of Maternity, Infancy and Child Hygiene of the New York State Department of Health, reported the methods employed in that State in lowering maternal and infant mortality.

Dr. Ralph W. Lobenstine discussed maternity care in hospitals. Dr. John A. Ferrell spoke on the subject, "Training Counties for County Unit Public Health Workers." Miss Hazel Corbine elaborated the problems incident to training the public health nurse.

Other speakers included Dr. Matthias Nicoll, Dr. Emily Gardinio and Dr. May E. Brydon of Virginia, Mrs. Mary B. Davis of New Hampshire, Dr. E. C. Hartley and Dr. F. L. Adair of Minnesota and the Hon. James J. Davis, United States Secretary of Labor.

Representatives of forty-five States and the territory of Hawaii were in attendance.

YALE SCHOOL OF MEDICINE—The General Education Board, *Science* announces, has provided the entire cost of a new addition to the Anthony J. Brady Memorial Laboratory. The construction of this building, which is to cost $1,250,000, was begun several months ago and it is now expected that it will be completed by the beginning of the next school year.

The new building is at the corner of Cedar Street and Congress Avenue and is joined by a covered archway to the Administration Building of the New Haven General Hospital. Its ground floor will be devoted to technical proceedings essential to the laboratory work and will include surgical pathology activities and a photographic laboratory. The first floor is to be devoted to pathology, the second floor to the department of public health and the third to bacteriology. The fourth floor contains a dormitory suite for the staff in pathology and bacteriology.

A CASE OF LEPROSY IN BOSTON—A resident of Watertown recently applied for treatment at the Massachusetts General Hospital and was found to be suffering with leprosy. He is under the care of the city Department of Health and will later be removed to the leprasorium at Carville, La.

Dr. Mahoney, Boston City Commissioner of Health, assures the public that there is no occasion for alarm.

Leprosy is not feared as much as formerly because of better understanding of the problems involved in the care and treatment of those afflicted with the disease.

MENTAL HYGIENE FELLOWSHIP AWARD—The National Committee for Mental Hygiene has awarded a fellowship for training in extra-mural psychiatry to Dr. Donald H. Linard of Providence, R. I. Dr. Linard holds a B.A. degree from Ohio State University and an M.D. degree from Jefferson Medical College, class of 1926, and has had psychiatric experience as a member of the staffs of the Danvers State Hospital for Mental Diseases, Massachusetts, the Belchertown Hospital for the Feebleminded, Massachusetts, and Butler Hospital, Providence, Rhode Island. Dr. Linard's first assignment for study is to the Judge Baker Foundation in Boston.—*Mental Hygiene Bulletin.*

THE PREVALENCE OF SMALLPOX—The Surgeon General of the United States reports that smallpox was more prevalent in this country for the week ended March 10th, 1928, than was reported for the corresponding period in 1927.

The increase has been especially marked in rural districts and is probably due to lack of vaccination enforcement. The reports show 1241 cases reported in forty-two States in that week noted above as compared with 945 in 1927.

UNIVERSITY OF PENNSYLVANIA CONFERS DEGREES—On the occasion of the Harvey tercentenary meeting of the Philadelphia College of Physicians on March 22, *Science* reports, Jefferson Medical College and the University of Pennsylvania conferred the honorary doctorate of laws upon Sir Humphry Davy Rolleston, physician-in-ordinary to King George of England, and the degree of doctor of science on Dr. J. J. R. Macleod, professor of physiology in the University of Toronto.

ORIGINAL ARTICLES

OBSERVATIONS ON SPINAL ANESTHESIA WITH A REPORT OF 500 CASES

BY BORIS RAPOPORT, M.D.*

IN looking over the literature of spinal analgesia, I was very much surprised at the diverse opinions expressed by different men regarding its efficacy and safety and at the number of failures reported, which aggregate in some instances as high as ten to fifteen per cent.

My experiences with this subject covers a period of nine years, during which time I have administered 500 spinal analgesias for various operations. In every case careful observations with notations were made and I am therefore in a position to give a detailed account of the results.

In the first place I wish to make a definite statement that every failure in spinal analgesia is due to some error in technic, and that the fault lies either in the apparatus which allows leakage, or in the patient who moves during the injection and displaces the needle, or in the anesthetist who lacks knowledge about the subject or is inexperienced in the essentials of administering this anesthetic. Although to be sure, the depth and length of the analgesia will vary with each individual, since various subjects are differently affected by the same drug, nevertheless, given a potent drug, a faultless apparatus, and a perfect technic, there will be no failure.

For my own part, while I do not wish to minimize the hazards from spinal analgesia, yet I fail to see where it is more dangerous than any inhalation anesthetic, particularly in view of the fact that this form of anesthesia is mostly practised on patients who are not in perfect health, and whose vital organs are more or less in a condition of impairment.

It seems to me that the reason for the discrepancy of opinions regarding the safety and practicability of spinal analgesia is due entirely to the conditions under which this type of anesthesia is practised rather than to the method itself. It can be readily seen how a surgeon who undertakes to act the part of anesthetist and operator at the same time will very quickly get discouraged with the results. Spinal analgesia does not consist of just a skilful penetration of the subarachnoid space and the injection of a certain measured dose of a drug. There are in every case a number of minute details that must be considered,—such, for instance as the choice of the patient, the kind of operation and its anatomical location, the matter of preliminary medication and the dose of the anesthetic drug, also the careful handling of the patient all through the operation and the necessary treatment of dangerous conditions which are apt to occur during the operation.

Only the experienced anesthetist knows how to meet these conditions. At a time when the surgeon has to concentrate all his mind on the operation he cannot at the same time pay attention to all these important details. And in order to render spinal analgesia safe and workable it is necessary to employ the large experience of the anesthetist.

The following is a tabulation of the operations performed in the 500 cases upon which the observations herein were founded:

Supra-pubic prostatectomy	89
Perineal prostatectomy	22
Single inguinal hernia	51
Double inguinal hernia	30
Double inguinal hernia and hemorrhoids	2
Femoral hernia	8
Hemorrhoids	31
Ventral hernia	4
Vaginal interposition of uterus	33
Plastic (cystocele and rectocele)	16
Plastic and laparotomy	19
Abdominal hysterectomy	22
Vaginal hysterectomy	18
Amputation below knee	39
Amputation above knee	22
Tumor of urinary bladder	19
Stones in bladder	15
Resection of bladder diverticulum with repair of hernia	1
Appendectomy	10
Obstruction of the bowels	5
Hydrocele	4
Amputation of toes	3
Stone in common duct	1
Cholecystectomy	8
Gastro-enterostomy	4
Pilo-nidal sinus	4
Ovarian tumors	11
Gastrectomy for cancer and gastro jejunostomy	2
Manipulation of fracture of the hip	1
Resection of varicose veins, both legs	2
Removal of the testicle	2
Caesarian section	2

Of these patients, 273 were males and 227 females. The ages ranged from eighteen to eighty-nine; the average age was fifty-one. In each case there was a well-defined reason for preferring spinal analgesia to any other anesthetic. Old age was a great factor in many cases, but there were other conditions, such as diabetes, sepsis, myocarditis, bronchitis, nephritis, pulmonary tuberculosis, hypertension and general debility.

CHOICE OF THE PATIENT

Not all patients are ideal subjects for spinal analgesia. Nervous and hysterical patients will

*For record and address of author see "This Week's Issue," page 466.

do better with a general anesthetic. Children and young adults are too apprehensive under this form of anesthesia. Consequently it should be practised on this type of patient only under conditions where every other anesthetic is contra-indicated. On the other hand, old people behave very well under spinal analgesia. Whether they show it clinically or not, there usually is in old people a weakened condition of the heart, lungs and kidneys. Any anesthetic which does not further tax these vital organs is certainly preferable to one that does.

I do not believe that spinal analgesia should be used for patients who are in shock or moribund, when a small drop in blood pressure is apt to carry them off. In the extremely sick, ready-to-die patients where local anesthesia cannot be used, an inhalation anesthetic, particularly ether, which has a stimulating effect, or even gas-oxygen which has a tendency to raise the blood pressure, is preferable. In shock due to trauma of the lower extremities and pelvis, spinal anesthesia is of great benefit since it reduces the shock by cutting off all stimuli going to the brain from the traumatic region. As for other contra-indications to spinal analgesia, so far as I know there are none, except where there is definite disease of the nervous system.

There seems to be a prevalence of opinion that low blood pressure is a contra-indication to spinal analgesia on account of the reaction which is apt to occur and reduce the blood pressure still further to a dangerous degree. In my experience this is not the case. I found that under spinal analgesia the blood pressure drops proportionately much lower in cases where it was originally high than where it was low. Hence a patient with a blood pressure of 100 may only have a drop of 20 points, while a patient with a blood pressure of 180 may have a drop of 90 points. And it is a well-known fact that one who is constantly used to a low blood pressure will be less affected by a drop of 20 points than one with a high blood pressure would be by a drop of 90 points.

One patient of my series, who had a blood pressure of 95/60, was operated upon three different times under spinal anesthesia without any bad effects. One operation was a suprapubic prostatectomy, another was for a double inguinal hernia, and the third for a recurrent inguinal hernia. In each case his blood pressure dropped only about fifteen points without the patient being in any way affected by it. The lowest blood pressure met with was in a man of 63 with a blood pressure of 85/55, who went through an operation for removal of the prostate without any ill effects whatsoever.

PRELIMINARY MEDICATION

I consider a preliminary hypodermic of morphin before operation of just as much importance in spinal analgesia as it is in all other anesthesias; and more so, since morphia allays shock and dulls consciousness, two very necessary elements. There is no objection to the patient's having orange juice and water before operation, provided, of course, the operation is not on the stomach. I allow the patient some water even during the operation. A preliminary night's rest is essential even if it should necessitate a hypnotic to bring it about.

TECHNIC

Asepsis should be strictly observed as in any other surgical procedure. The apparatus should consist of a 10 c.c. syringe, two lumbar puncture needles with stilets and short beveled points, a hypodermic syringe with two needles, a medicine glass, a tablespoon and an alcohol lamp. I prefer needles that are made of hard metal, since they do not bend easily at the least touch of bone that we are apt to encounter on the way to the spinal canal. These needles should have a small gage and the points should be sharp so that the dural puncture will be as small as possible and will not allow leakage after the needle is withdrawn.

Always test the apparatus before boiling. If you don't do this you will very often be disappointed by a stilet that won't budge out of the needle, a leaky syringe, or an imperfect fit between the tip of the syringe and the needle. New needles and syringes should not be relied upon until you are sure that they are perfect. Always carry your own apparatus with you; do not rely on hospital apparatus.

The patient should be in a sitting position preferably, and only when this is not possible should a lateral recumbent position be resorted to. The head should be bent over the chest and the shoulders thrust forward. The hands should be placed between the knees and a nurse should stand in front of the patient to support him and prevent him from moving. The back should be scrubbed with soap and water and painted with tincture of iodine.

The desired interspace is located by drawing an imaginary line, or by using a towel connecting the two iliac crests, which are palpated by an assistant or by the anesthetist himself through a sterile towel. The straight line will cross the fourth spinous process. The third and fourth interspaces can be located above or below that line. I use the fourth interspace for all operations on the lower extremities, perineum and rectum. For the urinary bladder I use the third interspace. For intra-abdominal operations below the umbilicus I inject the solution into the second interspace. For upper abdominal operations such as gall-bladder, stomach and pancreas, I use the first lumbar interspace. I never find it necessary in upper abdominal operations to inject the solution any higher. Of the twenty-two cases in my series of upper abdominal surgery done under spinal anesthesia, twenty were

successful. One was a complete failure and one did not have full analgesia.

The point of injection can be indicated by a depression with the finger on the skin, which leaves a mark on the iodine coating. A skin wheal of novocain (1%) is then caused by a hypodermic syringe, some of the novocain also being introduced into the deeper structures. The lumbar puncture needle is pushed through the skin in the median line. The needle is pushed forward and a bit upward until it comes to a point of slight resistance which gives way readily and you have the sensation of entering a hollow cavity. This means that you have penetrated the dura and entered the subarachnoid space. If you meet with bony resistance, the needle should be partially withdrawn and the point directed away from the encountered bone. In rare instances you may be faced with a condition where you are unable to obtain spinal fluid. This is known as a "dry tap." To my mind a dry tap is only possible where the needle does not enter the spinal canal, unless in tumors of the spinal cord where there might be adhesions between the dura and the cord. I have met with three cases of so called "dry tap." In two cases the trouble was due apparently to an exostosis of the vertebrae, since I encountered bony resistance in whatever direction I pushed the needle. In one case the trouble was due to a deformity of the spine caused by Pott's disease.

After entering the spinal canal, the stilet is withdrawn and about 5 c.c. of spinal fluid are allowed to escape. The anesthetic solution is then injected slowly. When removing the needle, push the plunger of the syringe against it in order that the pressure of the spinal fluid may not return some of the anesthetic solution back into the syringe. After removing the needle, place a sterile sponge on the puncture wound and put the patient on his back in the slightly Trendelenburg position. Analgesia should appear within two to fifteen minutes. As a rule, the earlier the analgesia appears, the more perfect it is.

Diffusion of the drug takes place rapidly, as may be observed from the way a reaction sometimes sets in quickly. The anesthetic effect is produced mostly by local contact with the naked nerve trunks, which are acted upon by the drug mixed with the spinal fluid. This flows outward in the tissue spaces of the sheets enveloping the spinal nerves.

Analgesia begins first in the lower extremities and extends upward. In about 75% of my cases it reached up to the umbilicus. In another 20% it extended to the costal border or ensiform cartilage, and in a small percentage of cases it went up as far as the nipple line and even higher up to the neck.

FAILURES

While there is a possibility of a special idiosyncrasy to novocain, yet the probability is remote, judging by the way local anesthesia succeeds in almost every case. In my opinion the inferior potency of the drug accounts for some of the failures, but the majority of them are caused by errors in technic or by faulty apparatus. In other words, failures occur in cases where either the drug did not possess its full strength due to evaporation or deterioration, or where the drug did not wholly or even partially enter the spinal canal. A poor fit between the syringe and the needle may cause some of the anesthetic solution to escape. Sometimes a faulty syringe will allow leakage of some of the solution through the plunger. But the usual and most common cause of error is an imperfect penetration of the dura. Some spinal fluid will leak through the small puncture and will come through the needle in slow drops. The escape of spinal fluid causes one to believe that the opening of the needle is wholly within the spinal canal, while, in truth, the point of the needle has only pierced a small hole in the dural sheath and has not completely penetrated it. The pressure exerted by the injected solution pushes the dura further away from the needle and allows the escape of the anesthetic solution outside of the subarachnoid space.

In my experience all failures occurred in cases where there was a slow drop of the spinal fluid or where, due to the patient's restlessness, the needle had been moved out of place during the process of injecting the solution. I have made it a rule never to be satisfied with a slow drop flow of the spinal fluid, and whenever this occurs I manipulate the needle until a good stream is established before I inject the anesthetic solution.

Out of five hundred cases I have had twenty-six failures (5-1/5%). But it is worthy of note that of that number eleven occurred in the first hundred cases; seven in the second hundred; four in the third hundred; and only two each in the fourth and fifth hundreds. This proves the value of experience and improved technic. There were sixteen cases of incomplete anesthesia, where the use of gas-oxygen had to be resorted to during part of the operation.

DRUGS AND DOSAGE

While there are various drugs on the market which can successfully be employed for spinal analgesia, the most commonly used is novocain either in liquid, crystal, or tablet form. Labat recommends the use of novocain crystals contained in a sealed glass tube, which are to be dissolved in the spinal fluid. I consider the delay in preparing the solution in that manner an unnecessary hardship on the patient. After the spinal canal has been entered and a certain

quantity of spinal fluid has been removed, the patient usually feels faint and the quicker the needle is withdrawn and the patient put on his back, the less apt is he to get an unfavorable reaction, such as we often see in spinal analgesia. I therefore prepare the anesthetic solution beforehand and have it ready in the syringe, so that the minute I enter the spinal canal after the escape of a little of the spinal fluid, I immediately inject the solution. The whole procedure should not take more than a half a minute.

I use Procaine Tablet C (novocain 0.05 grams; suprarenin 0.000083 grams) and as an average dose for a patient who weighs 150 pounds, I employ one and a half C. tablets dissolved in 5 to 6 c.c. of saline solution. I boil the novocain with the saline over an alcohol lamp until the tablet dissolves, then I draw up the solution into the syringe with the aid of a hypodermic needle. This allows the collection of every drop of the solution, which without the aid of the needle could not be done. While Labat and others advise as an average dose 0.10 grams of novocain, I find that I can get along with only 0.075 grams, or one quarter less. The exact dose is difficult to determine, for what is a large dose for one may turn out to be a small dose for another. But here, too, experience will teach one to judge the dose according to circumstances. The weight of the patient, the extensiveness of the operation, the length of time required, and the anatomical location of the operation must be considered. Also the state of mind of the patient is a great factor in determining the dose. Nervous patients will require a larger dose than those with calmer temperaments. Such patients require a more complete analgesia in order to abolish mental pain, and to keep them well relaxed for the operation. Also patients who, on account of suffering and pain, have been given for a protracted period large doses of morphine, will require a stronger solution in order to abolish all sensation.

A citation of the following case will give a complete illustration of the last two mentioned conditions combined in one patient.

This was a young man of twenty-three who, five months previous to operation, developed a gonorrheal arthritis of the knee. The latter turned into a purulent condition and it required several operative procedures in the attempt to relieve it. In the meantime the patient suffered agony which could only be allayed by large doses of morphine. He became very nervous and apprehensive, could not sleep nights, lost his appetite and dropped fifty pounds in weight. A few weeks before the operation he developed osteomyelitis of the same leg. He became septic, anemic, and emaciated. The leg got so bad and the patient so difficult to manage that it was decided to do an amputation above the knee. Unfortunately the case was out of town, and my acquaintance with the circumstances was meagre.

The first impression I got from looking at the patient was that a minimum dose would carry him through. He was debilitated and weighed not over one hundred pounds. But upon seeing how nervously he acted and how he resisted every approach, I decided on the average dose of 1½ C tablets dissolved in 5 c.c. of saline, giving a solution of about 1½%. Here my judgment failed me. I should have considered the fact that this patient, being used to large doses of morphine, would require a larger amount of novocain in order to abolish all mental as well as physical pain. Had I used a 2% solution instead of 1½%, it would have supplied the 25% of analgesia which was lacking and which had to be augmented by resorting to the use of gas-oxygen.

For patients who are in extremely poor shape before operation it is advisable to use a small dose of the anesthetic solution, 1¼ C tablet (0.06 gm.) with the hope that that will suffice, as it very often does. But if the anesthesia is not complete, it can be supplemented by gas-oxygen during the most traumatic part of the operation.

If, for some reason or other, after waiting fifteen to twenty minutes, analgesia does not take place, the process may be repeated and the same amount of anesthetic solution injected in the next interspace. I have tried it on three patients with complete success.

CONDITION OF THE PATIENT DURING OPERATION

After injecting the anesthetic solution, place the patient on his back and put the table in a slight Trendelenburg position. The most severe reactions are usually those which follow soon after injection of the solution. There may be one or several of the following manifestations:—nausea, vomiting, headache, cold perspiration, extreme pallor, relaxation of the sphincters, marked weakness, air hunger, shock and asphyxia.

It is advisable not to start the operation while the patient is suffering from a severe reaction. And if the operation has been started, it is best to cover up the wound and wait until the patient's condition improves. In the meantime therapeutic measures are to be used to help the patient get back to normal.

I found little value in adrenalin chloride or ephedrin sulphate. The vaso-constrictors of the abdominal blood vessels are beyond control of any drugs on account of the cutting off of the rami communicantes. And whatever direct action upon the heart itself these drugs may possess, this is counterbalanced by their action in contracting the peripheral blood vessels which are already devoid of blood as it is. Of the different drugs recommended, I found caffein-sodium-benzoate to be of some value. The rami communicantes which connect the cerebro-spinal nervous system with the sympathetic systems are paralyzed. Consequently the vagus, which has a depressive effect upon the heart, is not counterbalanced by the stimulating effect of the sympathetic system. The result is a slowing of the heart. Hence caffein, having a direct action upon the heart, will to some degree overcome the retardation caused by the vagus.

Of the greatest value, however, is the change

from the slight Trendelenburg to the extreme Trendelenburg postion, which should be resorted to in any case of a bad reaction before any drugs are used. With this position mere gravity will drain the relaxed abdominal blood vessels and fill the vessels of the brain.

I record the pulse every five minutes and the blood pressure every ten minutes. There usually is an initial rise of the pulse, then it slowly goes down. This downward drop is not straight but zigzag. At the end of twenty to thirty minutes it settles down to a slow uniform rate, giving a picture like this:—

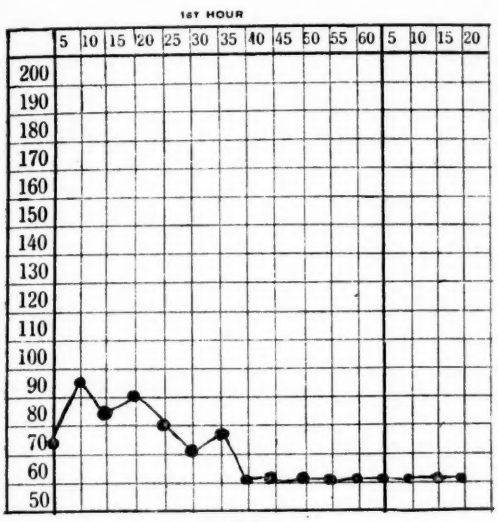


FIGURE I

Where no reaction takes place, the variations of the pulse and blood pressure will be much less or none at all. With the blood pressure there usually is an initial drop which constantly gets lower and lower until it reaches in some cases as low as 70/40. This low blood pressure does not disturb the patient very much and causes no bad effects.

The patient very often complains of feeling numb in the lower half of the body. He should be assured that no harm will result and that the numbness will pass off in from one to two hours. Incontinence of feces and urine very rarely happens during the operation. This never keeps up after the anesthesia wears off.

Nausea and vomiting may take place in the absence of any reaction whatever. It frequently starts from handling the bowel or from rough manipulations in the course of the operation. The patient gets a little restless before the vomiting; he complains of "feeling badly." After the vomiting he gets complete relief and calms down. If the vomiting is persistent, it should be controlled by instructing the patient to take deep breaths and by placing a cold wet towel on his forehead. Wiping the patient's forehead with alcohol and letting him smell some of it does away with nausea.

I have had three patients who complained of air hunger. This in each case lasted about five minutes. There was no cyanosis, no actual difficulty in breathing, and, except for the patient's complaint that he could not breathe, there was nothing indicating the condition. Once in a while a bad reaction will be initiated by an asthmatic attack. This happens especially in old patients subject to cardiac asthma. Adrenalin chloride or ephedrin sulphate may be tried in these cases.

About one in every five gave a slight reaction, where the patient became pale and was covered with a cold perspiration; the pulse became slow and weak coming down to the rate of about 60, while the blood pressure dropped to 80/50. About one in every nineteen suffered a severe reaction, where the patient actually became pulseless and the blood pressure could not be recorded. The condition fortunately does not last long, and, with the treatment just described, the patient picks up quickly and the surgeon is able to resume the operation.

Should the patient stop breathing, artificial respiration has to be resorted to until the effect of the drug wears off. I have had one such patient who stopped breathing about twenty minutes after the injection of the anesthetic solution. He was a man of eighty-four operated on for urinary calculi. The operation was almost at an end when all of a sudden he became unconscious and stopped breathing. Since his pulse was of a fairly good quality, all I had to do was to keep up artificial respiration at short intervals until, half an hour later, he regained consciousness and began to breathe naturally.

On putting the patient to bed after the operation, the foot of the bed should be raised on blocks and kept that way for a few hours. The Fowler's position should not be used immediately after the patient is put to bed, since the anemia of the brain caused by the lowered blood pressure will be still more aggravated by this position. No rectal medication should be instituted until the anesthesia has worn off and full control of the rectum is established.

It must always be kept in mind that the end of the operation does not mean the end of the spinal anesthesia. A prostatectomy will sometimes only last fifteen minutes, while the spinal anesthesia will continue for another hour or longer. It is therefore imperative for the anesthetist either to remain with the patient himself, or to put a competent assistant in his place until the gross effects of the drug have worn off. One need not repeatedly keep on asking the patient how he feels. It is best not to disturb him. All that is necessary is to watch his color, pulse and blood pressure, and note his behaviour. These are the best guides to his condition.

COMPLICATIONS

Of the 500 cases there was no death directly due to the spinal anesthesia. Aside from the number of severe and mild reactions that I

mentioned before, there were nineteen patients who developed pneumonia during the convalescence, seven of whom died. Four patients died of heart failure due to myocarditis which existed before operation. None of the last four deaths, however, occurred during the first 48 hours after the operation. There were other operative deaths which had nothing to do with the anesthesia.

It is interesting to note that almost all of my cases distinguished themselves by a complete absence of headache, which is so much emphasized in other reports on spinal analgesia. I think that the reason why so few of my patients complain of headache is that I withdraw much less of the spinal fluid than others do, and that I also have the anesthetic solution prepared beforehand, and therefore allow the needle to remain in the spinal canal for a much shorter time.

There are no unpleasant after effects and the convalescence is accomplished with much greater ease and in less time than with an inhalation anesthetic.

In conclusion, I wish to state that spinal analgesia, when judiciously employed for the right case by one thoroughly acquainted with the details and well experienced in its administration, will, in the long run, prove to be a life-saving measure for many patients afflicted with heart, kidney and lung trouble, as well as for those suffering from diabetes, sepsis and old age. Let us not, therefore, overemphasize the dangers of spinal analgesia and in that way discourage its employment, but let us try rather to perfect our technic, by which alone we can eliminate these dangers and bring the number of failures and complications to a minimum.

SUMMARY

1. Only experienced anesthetists should practice spinal anesthesia.

2. There are no contra-indications to spinal anesthesia except a moribund condition of the patient and disease of the nervous system.

3. Patients with low blood pressure do better under spinal anesthesia than those with abnormally high blood pressure.

4. Failures and complications can be eliminated by perfection of technic and gradation of the dose of the drug according to the demands of the individual case.

5. In upper abdominal operations it is not necessary to inject the solution any higher than in the first lumbar interspace. High anesthesia can be obtained by using pressure during the injection.

6. Spinal anesthesia is as effective for upper abdominal surgery as for lower abdominal. The relaxation is perfect.

7. The shorter the time the point of the needle remains within the spinal canal and the less spinal fluid withdrawn, the less likely the patient is to complain of headache or to have a severe reaction.

8. Serious complications from spinal anesthesia are rare, and the recovery is accomplished without any after effects.

9. The Trendelenburg position is the only effective remedy against bad reactions.

SOME THOUGHTS ON THE PAPERS READ BEFORE THE SUFFOLK DISTRICT MEDICAL SOCIETY ON MARCH 28, 1928

Between the hygienist who strives for a germless world and the bacteriologist who strives for an immunized individual, the physics of the human body may be overlooked.

It is known, by logic and experience that certain cases of asthma in children and adults, especially the former, do get results by operation; some cases of perennial sneezing, get results by operation; many cases of colds are benefited by the same procedure. These are the cases where there is deficient ventilation and drainage, pressure and initiation of tuberculum septi in other words, there is nasal obstruction, high posterior deviation of the septum, wedged in middle turbinate, or cases that have a definite pathology, such as infected sinuses, polypi, etc. The symptoms of asthma are brought about by extension downward, either direct or through the lymphatic circulation. Infected tonsils and adenoids either with or without demonstrable thin discharge coursing the pharynx may cause cough, sometimes croupy and an asthmatic wheeze.

Why should some patients under the above conditions get symptoms of asthma, etc., while in others there are only local manifestations? Is it entirely a question of immunity, or do the physics of the body, the anatomy, shape of the structures in question, and the number and arrangements of the follicles and glands play an important role?

Thousands of children are having colds annually, and only few, comparatively, have middle ear complications. Is it again entirely a question of immunity that some have, so to say, immunized ears and the others have not, or is it due to pathological structures and their physical proximity to the middle ear, the size of the natural opening of the pharangeal end of the eustachian tube, the arrangements of the follicles, etc.?

Head colds with sinus infections are other examples.

The question is now when a patient presents himself with one or more of the above conditions, shall we go and try to immunize him first, or shall we correct the deformities and pathology first, and then immunize him if necessary?

JOSEPH PRENN, M. D.
536 Commonwealth Avenue.

MEDICAL PROGRESS

PROGRESS IN THORACIC SURGERY FOR 1927*

BY EDWARD D. CHURCHILL, M.D.†

PHYSIOLOGY AND EXPERIMENTAL PATHOLOGY: The duration of the pulmonary circulation time has been measured in man for the first time by Blumgart and Weiss (*Am. Jour. Physiol.*, lxxxi, 466). By the circulation time is meant the period that elapses while a substance introduced into the blood stream traverses the network of lung capillaries in completing the circuit from the right side of the heart to the left. The average duration in resting males is only six and five-tenths seconds, with a range extending from four seconds to eleven seconds.

The physiology of the act of coughing is considered by Brown and Archibald (*Am. Rev. of Tuber.*, xvi, 111). The experimental results of the action of cough on iodized oil, iodized oil-sputum emulsion and thick tenacious sputum which had been injected intratracheally in cats, are presented. It was observed that cough alone increased the rapidity and degree of the penetration of the oil and oil-sputum emulsion, and that this was even more marked when tracheal compression was applied, thus showing an actual "in-driving" action of cough. No similar "in-driving" action of cough on thick tenacious sputum was noted. The relation of cough to certain postoperative pulmonary complications is discussed. It is concluded that cough may tend to drive fluid substances, similar to iodized oil, deeper into the pulmonary tree, but that it is incapable of such action on a heavier substance such as thick tenacious sputum. The inspiratory widening of normal bronchi has been demonstrated by Heinbecher (*Jour. Clin. Inves.*, iv, 459) by means of lipiodal injection. This has long been known through direct bronchoscopic observation.

Cutler and his associates (*Ann. Surg.*, lxxxvi, 165) have continued their investigations concerning the experimental production of lung abscess by the injection of septic thrombi into the jugular vein. In order to produce an abscess it is necessary to have on one hand organisms present of such virulence as to continue growth, and on the other the further and more intricate problem of an immunity insufficient to kill off the organisms when they reach the lung and yet sufficient to wall them off into a localized lesion. A summary of the investigations conducted on this subject is given by Cutler in the McArthur Lecture on the Billings Foundation (*Proceedings of the Institute of Medicine of Chicago*).

The belief that abscess of the lung finds its etiology in the aspiration of infected material, particularly in those cases following operation, has found important support in the work of Smith (*Arch. Surg.*, xiv, 231). This investigator produced pulmonary abscesses in mice, guinea-pigs and rabbits by intratracheal inoculation of material scraped from the teeth of patients with pyorrhea. The same morphologic types of organisms were recovered from these abscesses as occur in abscesses in man, namely, spirochetes, fusiform bacilli, streptococci and vibrios.

PNEUMONOGRAPHY: Reports continue to come from clinics concerning series of cases in which the injection of radio-opaque substances into the bronchial tree has been of material aid in establishing the diagnosis and affording a picture of the pathological anatomy which serves as a guide to treatment. This procedure has passed the experimental stage, and may now be considered to be of proven value in certain cases of pulmonary disease. No real evidence has been produced to substantiate the earlier claims of a beneficial therapeutic effect of the liberated iodine.

Hedblom (*J. Am. M. Ass.* lxxxix, 1384) is so optimistic about the use of lipiodal that he compares its value in the chest to that of the bismuth meal in the abdomen. In the hands of Ballon and Ballon (*Arch. Surg.*, xiv, 184) its use has encouraged the authors to give a classification of the types of bronchiectasis, based on the X-ray shadows. The same writers discuss its use in abscess and in carcinoma of the bronchus (*Med. Jour. and Record*, cxxv, 225; *Surg., Gyn. & Obs.*, xliv, 1). Their custom is to employ 40 per cent. iodized oil injected through the bronchoscope.

Archibald (*Arch. Surg.*, xiv, 206) finds the injection of iodized oil by the supraglottic method to be of diagnostic value in certain cases of pulmonary tuberculosis following thoracoplasty. He is able to demonstrate cavitations which can be aided by further plastic operations. Singer (*Arch. Surg.*, xiv, 167) uses iodized oil first by intrapharyngeal introduction as the patient takes a deep breath; if this fails the solution is injected between the anaesthetized vocal cords. Injection by bronchoscopy is employed only when this operation is performed for other purposes. He sounds a timely warning against drawing false conclusions from superimposed shadows, and indicates some of the pitfalls which are apt to trap those who have not had a considerable experience with suppurative lung conditions.

*From the West Surgical Service, Massachusetts General Hospital.

†For record and address of author see "This Week's Issue," page 466.

The views of the Chevalier Jackson clinic are expressed by Tucker (*Arch. Surg.*, xiv, 175) where the bronchoscopic method for the introduction of oqaque substances into the lung is considered as being safer for the patient and more accurate in its localization. The insufflation of bismuth subcarbonate is recommended for outlining the trachea and the larger bronchi, but iodized oil is considered better for use in abscess cavities and in the periphery of the lung.

The substitution of brominized oil for the iodine compound is suggested by Iglauer (*Surg., Gyn. & Obs.*, xlv, 82) on the basis that it is less irritating and therefore particularly suitable for use in the tuberculous patient.

No fatalities or deleterious results from the use of lipiodal in the bronchial tree have been noted. In this connection, however, the studies of Pinkerton (*Am. Jour. Dis. of Child.*, xxxiii, 259) should be carried in mind. This writer reports the finding of oily or fatty material in the lungs of children who during life had had oil drops introduced into the nares. The tissue reaction of the lung to the foreign material is described.

EMPYEMA: No notable contributions to the subject of the treatment of empyema have come to the notice of the reviewer. The indications for the open and closed methods of operation now seem to be clearly cut and the type of operation used is chosen to meet the needs of the individual case by the experienced operator. In general, cases in which there exists a serious encroachment on the vital capacity of the patient, which would be even further added to by the creation of a pneumothorax, require the closed drainage operation. A series of eighteen cases of empyema in children which were treated by the closed operation is reported by Parker (*Bos. Med. & Surg. Jour.*, cxcvii, 653). He employs the usual methods of catheter drainage with chlorazine irrigations.

Allen (*Surg., Gyn. & Obs.*, xlv, 23) states that postoperative empyema in chests not previously infected may be the result of trauma to the pleura (mechanical), or drying and chilling. It may also be the result of a hemothorax. A total of 150 experimental observations are recorded. These experimental results indicate the important rôle played by the hemothorax acquired during a thoracotomy, in the production of empyema following the operation.

In two cases of chronic empyema Jennings (*Ann. Surg.*, lxxxvi, 616) has mobilized the lung by making a wide flap opening in the chest wall and incising the pleura along the outer edge so that the lung may come forward.

LUNG ABSCESS: The experimental work dealing with the etiology of pulmonary abscess, particularly the post-operative variety, has been discussed above. The old discussion as to the rôles played by aspiration and embolism is still far from being settled. Ochsner and Nesbit (*Arch. Otolaryngology*, vi, 330) have observed that following the peritonsillar infiltration with procaine, iodized oil taken into the pharynx passed entirely into the tracheobronchial tree. This observation, the authors feel, removes the one objection to the aspiration theory of abscess of the lung following tonsillectomy.

There have been no noteworthy suggestions as to the treatment of this type of case. Pierson (*Calif. & West. Med.*, xxvii, 511) reports thirty cases of nontuberculous pulmonary suppuration, differentiating pulmonary abscesses of varying etiology from bronchiectasis and chronic pneumonia. In cases of acute abscess when medical treatment failed after a trial of from four to six weeks, surgical measures were instituted.

BRONCHIECTASIS: Although French investigators have been stressing the importance of spirochetes and fusiform bacilli in the etiology of acute and chronic suppurative conditions of the lung, their work has attracted little attention in this country until the studies of Smith. In a general discussion of the subject (*Am. Rev. of Tuberc.*, xv, 352) this author presents fourteen case reports, illustrating a wide variety of pulmonary conditions, in which he has found spirochetes and fusiform bacilli either in the pulmonary sputum or in the lung tissue. The fact that these organisms are found with extreme rarity in other lung conditions, such as pulmonary tuberculosis, indicates that they are not merely secondary invaders. Smith feels that bronchial spirochetosis may be the cause of primary bronchiectasis. An extensive bibliography is appended.

Another suggestion concerning the etiology of certain cases of bronchiectasis has been made by Churchill and Holmes (*Arch. Surg.*, xiv, 1093). They have recognized a group of cases of chronic pulmonary suppuration characterized by atelectasis of a single lobe of the lung, and believe that in certain cases, particularly those arising after operation, the atelectasis may be primary as in the so-called massive collapse of the lung. Stagnation and infection of the secretions retained in the dependent bronchial tree is thought to lead to the production of the foul purulent sputum.

An important contribution to the treatment of chronic suppurative bronchiectasis has been made by Whittemore (*Ann. Surg.*, lxxxvi, 219) and is particualrly applicable to the type of case described in the preceding paragraph. He describes a method of performing lobectomy based on the principle of the two-staged Mikulicz resection of the colon. The diseased lobe of the lung is brought outside of the chest wall which is closed tightly around it. Five cases are reported, two of which have been cured and have returned to their normal occupations and two of which were improved. There was one death from contra-lateral pneumonia.

Graham (*Ann. Surg.*, lxxxvi, 174) discusses the general aspects of the treatment of non-tubercular pulmonary suppurations. In a series of 45 cases in which the author's operation of cautery pneumonectomy has been carried out, 31 cases, or 69 per cent., have been made free of symptoms; 11, or 24 per cent., are dead from all causes; while only 3 deaths (6.6 per cent.) are ascribable to the operation. The common criticism of this procedure in the hands of other surgeons has been the liability to hemorrhage. In more than 100 extensive cauterizations performed in the 45 cases, only once did a fatal hemorrhage occur, and that was in a child.

Methods of treatment for chronic bronchiectasis based on the principle of compression continue to be stressed by Hedblom (*J. Am. Med. Ass.*, lxxxix, 1384). Lobectomy, he believes, is to be avoided because of the high post-operative mortality, and if attempted should only be done following compression measures. In early mild cases artificial pneumothorax or temporary phrenic nerve paralysis are indicated. In cases of long standing the treatment of choice is phrenico-exeresis and graded extra-pleural thoracoplasty. The end results of this latter operation, which has been particularly urged by Hedblom, are also reported (*Arch. Surg.*, xiv, 389). Of 14 cases of unilateral bronchiectasis followed for three years after graded extrapleural thoracoplasty, five have been practically cured from the standpoint of symptoms and general health. The operation should be performed in several stages under local anaesthesia, and should be reserved for cases of bronchiectasis uncomplicated by abscess.

The results of bronchiectasis in childhood are considered by Findlay and Graham (*Arch. of Dis. in Childhood*, London, ii, 71). Of twenty-three patients, nine died, two from septic pneumonia, one of whom had in addition early tuberculosis; one from hemoptysis; one from multiple cerebral abscesses; one from tuberculous meningitis, and four as a result of operation.

PULMONARY TUBERCULOSIS: There has been no notable change in the general principles underlying the use of surgical measures in the treatment of pulmonary tuberculosis during the past year. Paravertebral thoracoplasty is holding the place which has been established for it by the rapidly growing experience of operators both at home and abroad. The general principles of compression therapy and the history of the development of the operation have been discussed, with the addition of further case reports, by Whittemore (*Bost. Med. & Surg. Jour.*, excvi, 1), Lilienthal (*Ann. Surg.*, lxxxvi, 182) and Sayago (*Am. Rev. of Tuber.*, xv, 544). The statistics support the original claims of Sauerbruch, that approximately one-third of the cases are cured, that one-third are improved, while the remaining third either show no improvement or terminate fatally.

The necessity for supplementary surgical procedures to produce an adequate collapse of the lung occurred in 8 per cent. of a series of 51 thoracoplasties reported by Law (*Ann. Surg.*, lxxxvi, 227). Such a procedure is described by Welles (*Arch. Surg.*, xiv, 384) who recommends the removal of further sections of the upper ribs through an axillary incision in cases where inadequate collapse has been attained by regular posterior thoracoplasty. As the author states, this procedure is not new, and has in fact been practiced, at least in principle, by the German schools. Coffey (*Ann. Surg.*, lxxxvi, 683) describes an approach to the first rib through the posterior triangle of the neck which permits him to safely resect a longer portion than is done in the usual operation. If desired an avulsion of the phrenic or posterior thoracic nerve can be accomplished at the same time.

Archibald (*Am. Rev. of Tuber.*, xv, 564) feels that the reported deaths following extrapleural thoracoplasty are unnecessarily high. As factors tending to produce unfavorable results he lists one stage operation, the removal of too many ribs or too long portions of ribs and the use of local anaesthetics in large amounts. Cough during and soon after the operation, as regards the spread of the disease into the sound lung, is believed to be a greater source of danger than of safety. For this reason Archibald refuses to follow the argument of Lilienthal and of Alexander that the upper ribs should be resected first in order to lessen the dangers of postoperative tuberculous bronchopneumonia. The physiology of the act of coughing is considered by Brown and Archibald (*Am. Rev. of Tuber.*, xvi, 111) who conclude that whereas the usual action of cough is to expel material from the tracheobronchial tree, it may under certain conditions, actually bring about the opposite result—that is, drive material deeper.

The German clinics still continue to favor the single stage operation and to employ local anaesthesia. This tendency may well be due to the fact that the newer general anaesthetics, such as nitrous oxide and oxygen and ethlyene are not available in many of the clinics of that country. Brauer (*Deutsche med. Wochenschrift*, liii, 2060) performs a thoracoplasty in one stage if possible and puts particular emphasis on dividing the ribs as close as possible to the transverse processes. The periosteum is preserved particularly in the regions of the insertions of the tendons of the back muscles. With careful technique the spinal column remains straight, and the function of the muscles of the shoulder girdle is undisturbed.

INTRATHORACIC TUMORS: During the past few years medical literature has exhibited a number of articles on cancer of the lung, which almost without exception comment on the increased frequency of the condition. Duguid (*The Lancet*, July 16, 1927, p. 111)

tabulates the incidence of primary intrathoracic malignant disease in a series of 10,780 autopsies arranged in successive five year periods. The column of percentages shows a slight but consistent increase. Other statistical reports have been published by Strada (*Prensa Medica Argentina,* xiv, 117), Torres and Azevedo (*Mem. d. Instit. Oswaldo Cruz,* xx, 5) and from Padua and Milan by Casolo (*Ospedale Maggiore,* xv, 227, 261). The increase in the incidence has been attributed to various factors, any one or all of which may theoretically be held responsible. The effect of the influenza epidemic of 1918 may be significant, as the pathologic changes seen in the lung are frequently of a character that suggest precancerous epithelial proliferations. Other causes which have been mentioned are the increased practice of tarring the roads and the increased inhalation of irritating gases and products of incomplete fuel combustion.

Heuer (*Ann. Surg.,* lxxxvi, 229) reports 31 true tumors of the thorax, 15 of which were subjected to operation and in 11 of which it was possible to attempt a radical removal. The mortality was 10 per cent. A series of 16 cases of primary tumors of the chest is reported from the Mayo Clinic by Harrington (*Arch. Surg.,* xiv, 406). Eleven of the cases were malignant. Early extirpation of malignant tumors followed by radio-therapy has given the best results. In discussing the detailed symptomatology of primary carcinoma of the lung, Sherman (*Calif. and West. Med.,* xxvi, 40) points out that the condition is recognized earlier by bronchoscopy than by X-ray. The treatment suggested is cauterization, which is the one method by which pain can be relieved.

Evans (*Lancet,* May 21, 1927, p. 1077) has studied the distribution of the lymphatic metastases from carcinoma of the right bronchus. The permeation appears to be along four distinct routes which are described anatomically.

PULMONARY EMBOLISM: Meyer (*Deutsche Zeitschrift f. Chir.,* ccv, 1.) reports two successful operations for pulmonary embolism. One patient recovered completely, the second recovered from the operation but succumbed twenty-six days later to a new embolus. He used Trendelenburg's procedure, with certain modifications in methods and instruments, which he describes and illustrates. The second and third ribs are resected subperiosteally for a distance of from 10 to 12 cm. The pleura is not injured so pneumothorax is avoided. A longitudinal incision of 1.5 cm. is made in the pulmonary artery after the latter is temporarily constricted with a rubber tube. After removal of the emboli the incision in the vessel is closed with interrupted sutures.

The incidence of fatal pulmonary embolism among the surgical cases that came to necropsy at the Mayo clinic during the last ten years is 6 per cent. according to Henderson (*Arch. Surg.,* xv, 231). Patients at the clinic who die from pulmonary embolism are older than the average surgical patient; they are somewhat overweight, and, as a group, have a normal or somewhat subnormal blood pressure. A high percentage have postoperative infections. While the importance of the operative procedure in determining the site of thrombus formation and the occurrence of pulmonary embolism cannot be overlooked, other factors, such as age, weight, general condition of the patient, efficiency of the circulation, bodily inactivity incident to almost any operative procedure and infection, should also be emphasized.

Pulmonary embolism following operation seems to be a more common cause of death in the obese patient than of the average patient. Forty cases are analysed by Snell (*Arch. Surg.,* xv, 237). Whether this is due to the age of the patient, to the type of operation performed, to unknown factors related to the flow and coagulation of blood or to the obesity, *per se,* cannot be definitely stated. From a consideration of statistics it seems probable that there is a group of patients over 50 years of age, obese and with normal or subnormal blood pressure, who are particularly susceptible to pulmonary embolism as a postoperative complication.

Speed (*Ann. Surg.,* lxxxv, 44) presents a statistical analysis of thirty instances of pulmonary embolism from the Presbyterian Hospital of Chicago. Pulmonary embolism complicating pregnancy and the puerperium is considered by Bunzel (*Am. Jour. of Obst. and Gyn.,* xiii, 584) who found it occurring in approximately 0.1 per cent. of 31,716 pregnant patients. The incidence of pulmonary embolism was three times greater in operative than in normal deliveries, reaching 1.5 per cent. in all cases of cesarian section. In the entire series of thirty-two cases of embolism the mortality was 65 per cent. and in the cases that terminated fatally, 70 per cent. of the deaths occurred within an hour from the onset of symptoms.

A series of eighty-seven cases of postoperative phlebitis occurring at the Mayo Clinic are analyzed by Brown (*Arch. Surg.,* xv, 245). Pulmonary infarction was recognized clinically in twenty-nine cases (33 per cent.), but pulmonary embolism was not a complication. Comparison of the seasonal incidence and predisposing factors in phlebitis and pulmonary embolism shows certain clear-cut differences.

POSTOPERATIVE PULMONARY ATELECTASIS (MASSIVE COLLAPSE): Numerous case-reports of postoperative atelectasis have appeared in the literature as this condition is being more widely recognized. Nevertheless, no additional facts pertinent to its etiology have been noted. The weight of evidence seems to favor the view, previously

advanced, that the atelectasis is due to bronchial obstruction from retained bronchial secretions. Proceeding on this basis, bronchoscopy has been recommended as a therapeutic measure by the Philadelphia school, and a case is reported by Hearn and Clerf (*Ann. Surg.*, lxxxv, 54) in which bronchoscopic removal of thick tenacious secretion was followed by return of pulmonary function. Harrington (*Ann. Surg.*, lxxxv, 152) reports a similarly favorable result in an extremely sick patient in which death seemed inevitable.

The importance of a paralysis or partial crippling of the respiratory musculature in determining whether or not bronchial secretions will serve to produce complete obstruction, is illustrated by a case of acute meningitis with respiratory embarassment, in which collapse of both lower lobes was found at autopsy by Kletz (*Lancet*, ccxii, 179). The degree to which this same factor may play a part in the complication as it occurs following operation, is shown by the marked reduction in vital capacity which an operation on the abdomen entails. Churchill and McNeil (*Surg., Gyn. & Obs.*, xliv, 483) find that operations involving the muscles of the abdominal wall temporarily leave the patient with but 25 to 50 per cent. of his preoperative vital capacity.

Sante (*Radiology*, viii, 1) favors the view advanced by other writers that the phenomenon of massive collapse is due to some infection or insult to the region of the vagus supply, producing a reflex action on the bronchioles. Although this and similar arguments which invoke a reflex bronchiolar or vascular spasm are theoretically attractive, they have as yet no really valid supporting evidence.

MEDIASTINUM: By means of anatomic studies, aided by injection experiments, Lambert and Berry (*Arch. Surg.*, xiv, 261) demonstrate the pathways by which infections may spread from a focus in the mediastinum. Lerche (*Arch. Surg.*, xiv, 285) also discusses the topography of the mediastinum, with particular reference to the rôle which is played by the tracheobronchial lymph nodes in infections.

When a large pneumothorax is produced a hernia may appear in the upper anterior part of the mediastinum, even if the pressure in the pneumothorax cavity is negative. Cases showing such hernias are reported by Packard (*Arch. Surg.*, xiv, 306). Rupture of such a hernia may produce a bilateral pneumothorax and death.

HEART: Ramond and Weill-Spire (*Bull. et Mem. Soc. méd. d. hôp. de Par.*, xliii, 1163) describe the epigastric approach to the pericardial cavity. The xiphoid process is resected and the diaphragm exposed by pushing back the peritoneum. The pus is evacuated by carrying an incision through the diaphragm and pericardium. A case is reported with recovery following this type of drainage.

Mattison (*Surg., Gyn. & Obs.*, xliv, 113) reports a case in which cardiolysis was performed, with resulting relief of precordial pain and dyspnoea and relief of nervous symptoms. The operation of cardiolysis has not found many supporters, probably because the number of cases is extremely small in which the pericardial adhesions are in themselves the major cause of cardiac embarrassment. Usually the symptoms are attributable to inherent myocardial weakness.

The technique of cardiorraphy is briefly considered by Cutler and Beck (*Surg., Gyn. & Obs.*, xlv, 74), based on their extensive experimental experience. They advise the placing of a stay suture in the apex to steady the heart during operative manipulations.

PHRENIC NEURECTOMY: Artificial paralysis of the phrenic nerve continues to find a place in the armamentarium of the surgeon treating cases of pulmonary tuberculosis. Because the operation is quite simple to perform, its popularity has perhaps somewhat exceeded its real usefulness. The degree of collapse obtained by paralysis of one side of the diaphragm is in no way comparable to that produced by pneumothorax or extrapleural thoracoplasty, and the operation finds its chief usefulness as a test of the function of the opposite lung. In cases where improvement follows this preliminary operation, the operator may proceed with more radical measures with a greater degree of safety.

Lemon (*Arch. Surg.*, xiv, 345) sectioned one or both phrenic nerves in a series of dogs, producing paralysis and atrophy of the corresponding area of the diaphragm, extending to the periphery. Paralysis of one half of the diaphragm failed to affect respiration to the extent of preventing aspiration of iodized oil placed in the trachea. Intrapleural pressures usually indicated an equality in amplitude and degree of negative pressure during respiration. These experiments are easily understandable in view of the extremely flexible mediastinum of the dog, and are not to be referred to the situation in the human without certain reservations.

DIAPHRAGM: Lewald (*Arch. Surg.*, xiv, 332) records three cases in which there was a congenital absence of the left half of the diaphragm. The methods of differentiating this rare anomaly from true diaphragmatic hernia, eventration of the diaphragm and thoracic stomach are pointed out.

Lord (*Arch. Surg.*, xiv, 316) reports four cases of eventration of the diaphragm and discusses the diagnosis and treatment.

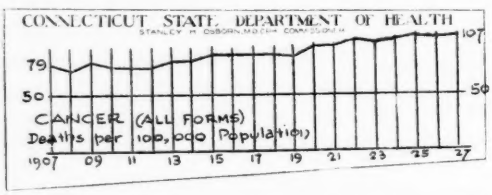
A case of congenital hernia of the diaphragm, which had previously had two emergency operations for acute strangulation of the intestines, is reported by Truesdale (*Ann. Surg.*, lxxxvi,

238). The hernia was reduced and the defect in the diaphragm repaired by a combined thoracoperitoneal approach, following failure to deal with the incarcerated bowel through an abdominal incision. A preliminary appendicostomy was performed.

Although small defects in the diaphragm may be repaired by the abdominal approach—particularly if the traction of the negative pressure of the pleural cavity is overcome by the insertion of a tube, as suggested by Mayo—the majority of operators prefer to use the thoracic approach, or at least one which admits of the resection of a number of ribs in the larger and, particularly, the adherent hernias. A partial thoracoplasty allows the defect to be repaired without undue tension.

CERVICAL RIB: In about 55 per cent. of the cases reviewed by Adson and Coffey (*Ann. Surg.*, lxxxv, 839), the cervical ribs were symptomless. The anterior approach and tenotomy of the scalenus anticus muscle are preferred by them to the transcervical approach and resection of the cervical rib, since the same relief is offered, the procedure is less formidable, and postoperative numbness in the arm and palsy of the brachial plexus are avoided.

CANCER DEATH RATE IN CONNECTICUT



It will be noticed from the chart above that the cancer death rate has increased considerably since 1907. Control measures for this disease have not as yet been as fully established as they have for diphtheria, typhoid and tuberculosis.

UNITED STATES PUBLIC HEALTH SERVICE

Chronological List of Changes of Duties and Stations of Commissioned and Other Officers of the United States Public Health Service

March 28, 1928

Surgeon Robert Olesen. Directed to proceed from Cincinnati, Ohio, to Nashville, Tenn., and such other places in Tennessee, as necessary in connection with field investigations of goiter conducted by the Public Health Service, also authorized and directed to return to Cincinnati, Ohio, on May 1 to 3, to attend meeting of the Ohio State Medical Association. March 17, 1928.

A. A. Surgeon O. V. N. Linhardt. Directed to proceed from Pitcher, Okla., to Curtis Bay, Baltimore, Md., for duty. March 20, 1928.

Chemist E. J. Theriault. Directed to proceed from Cincinnati, Ohio, to St. Paul, Minn., and to such other points in the State of Minnesota as may be necessary, in connection with field investigations of stream pollution. March 21, 1928.

Assistant Surgeon A. E. Russell. Directed to proceed from Washington, D. C., to Philadelphia, Pa., in connection with industrial hygiene studies being conducted by the Public Health Service. March 21, 1928.

Surgeon G. W. McCoy. Directed to proceed to Minneapolis, Minn., enroute to Washington, D. C., for conference regarding a leprosy situation in Minnesota. March 22, 1928.

Surgeon L. L. Williams, Jr. Directed to proceed from Richmond, Va., to Washington, D. C., and return, in connection with field investigations of malaria. March 22, 1928.

A. A. Surgeon Frank Liberson. Directed to proceed from New York, N. Y., to Gloucester City, N. J., for the purpose of inspecting X-ray equipment, at Immigration Station, in order to determine the suitability of the same for use in a marine hospital. March 23, 1928.

Senior Surgeon M. H. Foster. Directed to proceed from Chicago, Ill., to Superior, Wisconsin, and Duluth, Minn., for the purpose of inspecting and reporting upon service activities at those places. March 23, 1928.

Surgeon Edward Francis. Directed to proceed from Washington, D. C., to Richmond, Ind., and return, in connection with field investigations of Malta Fever. March 24, 1928.

Surgeon R. M. Grimm. Directed to proceed from Antwerp, Belgium, to Brussels, Belgium, for the purpose of representing the U. S. Public Health Service at the meeting of the Journees Medicales de Bruxelles, on April 21 to 25, 1928. March 26, 1928.

Assistant Surgeon E. B. Archer. Relieved from duty at Ellis Island, N. Y., and assigned to duty at Washington, D. C. March 26, 1928.

A. A. Dental Surgeon Adrian F. Werner. Relieved from duty at Port Townsend, Wash., and directed to report by wire to the Commandant, U. S. Coast Guard, Washington, D. C., for duty. March 27, 1928.

Chemist E. J. Theriault. Directed to stop over enroute in proceeding to St. Paul, Minn., at Chicago, Ill., for the purpose of a conference with officials of the sanitary districts of Chicago, in connection with field investigations of stream pollution. March 27, 1928.

Senior Surgeon John McMullen. Directed to proceed from New Orleans, La., to Atlanta, Ga., and return, for the purpose of making an address at the mass meeting closing Negro Health Week on April 8. March 27, 1928.

BOARDS CONVENED

The following board convened at the following places on April 9, 1928, for the purpose of examining officers of the Coast Guard for promotion.

Detail for the Board—Washington, D. C. Surgeon G. L. Collins, A. A. Surgeon Charles H. McEnerney.

Detail for the Board—Baltimore, Md. Surgeon J. W. Trask, Assistant Surgeon C. L. Wilmoth.

Detail for the Board—Stapleton, N. Y. Surgeon S. L. Christian, Assistant Surgeon G. R. Welch.

Detail for the Board—Boston, Mass. P. A. Surgeon (R) W. E. McLellan, Assistant Surgeon C. D. Kosar.

Official:

H. S. Cumming,
Surgeon General.

Case Records
of the
Massachusetts General Hospital

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED IN WEEKLY CLINICO-PATHOLOGICAL EXERCISES

EDITED BY R. C. CABOT, M.D.

F. M. PAINTER, A.B., ASSISTANT EDITOR

CASE 14091

RECURRENT MULTIPLE ARTHRITIS

MEDICAL DEPARTMENT

First admission. An American schoolboy fourteen years old entered May 16 complaining of pain in the ankles, knees, shoulders, neck and middle of the back.

He had had the pain for three weeks. The joints were stiff but not red, swollen or tender.

The family history so far as known is not significant.

He had had all the diseases of childhood and frequent sore throats as long as he could remember. Two years ago he was in bed two weeks with rheumatism "all over", with fever and swollen, red, tender and painful joints.

Clinical examination. Apex impulse of the heart seen and felt in the fifth space 3 3/4 inches to the left of the midsternal line, just outside the nipple line, corresponding with the left border of dullness. Action slightly irregular. Sounds of fair quality. Pulmonic second sound accentuated. A systolic murmur all over the precordia, loudest at the apex, transmitted to the axilla. A diastolic in the fourth left space. Right pulse greater than the left, both slightly irregular, small volume, low tension. Blood pressure not recorded. Liver dullness from the sixth rib to 3½ inches below the costal margin. Edge not felt. Marked spasm and tenderness. Nothing abnormal could be seen or felt in the joints.

Temperature 99.5° to 98.4°. Pulse 72 to 92. Respirations normal. Urine and blood not remarkable.

In four days the joint symptoms had disappeared. The heart was unchanged. May 23 the patient was discharged.

History of interval. After leaving the hospital the pain in the joints returned. The knees and ankles were swollen, red and tender. He had dyspnea by day, and for two nights before his readmission orthopnea. He had occasional attacks of sharp precordial pain.

Second admission, May 26, three days after his discharge.

Clinical examination. The diastolic murmur is now described as following the second sound at the apex and just inside it. Pulses equal, rapid, otherwise as before. Liver dullness from the fifth to the eighth rib. Ankles, knees, shoulders, elbows and back of neck painful on motion and tender.

Chart very much as before.

By June 6th the boy was running about. There was no change in the cardiac condition. Except for slight stiff neck there were no joint symptoms. June 6 he was discharged to the Waverly Convalescent Home.

History of interval. After leaving Waverly he was pretty well, and worked for a year. For the two following years he worked fitfully, with long intervals when he spent much time sitting in the sun. He played baseball with no special dyspnea. For two weeks before his third admission his knees, hips, elbows and shoulders were stiff and he had some cough. March 10 he raised half a teaspoonful of blood. He had to use three pillows.

Third admission. March 14, two years and nine months after his last discharge.

Clinical examination. Fairly well nourished. Tonsils large, ragged and slightly red. Apex impulse of the heart seen and felt in the fifth space 10 centimeters to the left of midsternum, 1.5 centimeters outside the nipple line, corresponding with the left border of dullness. Marked apical thrill which seemed to begin in systole and lasted into diastole. A presystolic murmur at the apex filled most of diastole. A systolic murmur at the apex. First sound not clear. Pulmonic second sound much accentuated. Blood pressure 100/75, 110. Lungs, moderate dullness in left upper front. Occasional piping râles at left base. The rest of the examination was negative.

Urine 12 to 112 ounces, specific gravity 1.008 to 1.020, the slightest possible trace to a very slight trace of albumin at the last three of eight examinations, a few leukocytes at three, rare granular casts at two, waxy casts at one, red blood cells at one. Blood: 21,500 to 4,000 leukocytes, polynuclear leukocytosis, hemoglobin 90 per cent. Two blood cultures, no growth. Sputum, many organisms, pneumococci predominant.

Temperature irregular, with waves of elevation to 102.9° and depression to 95.1°. Pulse 80 to 145. Respirations 18 to 47.

By March 20 the joint symptoms had quieted down. March 26 a loud double and irregular pericardial friction rub developed over the upper percordia from nipple to nipple and persisted for a month. Pressure signs developed in the left back. April 2 he complained of pain in the knees and feet. Salicylates had already been given until he could not tolerate them. April 5 the left base showed signs of beginning consolidation. April 9 he had pain in the right shoulder. His face was very edematous. April 13 he complained again of abdominal distress, which increased in the next days. The liver

edge was felt just above the umbilicus. The whole lower abdomen was dull, — ascites? Leeches applied over the liver relieved the pain somewhat. May 6 he was moaning continually because of abdominal pain. May 7 he died.

Discussion

BY RICHARD C. CABOT, M.D.

NOTES ON THE HISTORY

Anybody who reads that past history has the diagnosis, acute articular rheumatism. Rheumatism is less common in this community than it used to be. One of the distinctly pleasant things about health conditions is that we do not see so many of these cases of acute rheumatism as we used to. I do not know any explanation except that the tonsil chopping factories are so very active. On the whole I think the results are good for the public health. I think the wholesale destruction of tonsils is good. It is possible that better milk supplies also have something to do with the lessened incidence of rheumatism in this part of the country. Our milk supplies took a sudden change for the better about twenty years ago after a very serious sore throat epidemic with very serious consequences in other parts of the body. Before that milk was not pasteurized in this part of the world. Since that time it has been pasteurized. That is another possible factor bearing on this improvement in relation to rheumatism. You know probably that this is a disease the amount of which varies enormously in different parts of the world. Rheumatic heart disease in the South is rare compared with this part of the country. On the other hand, in England it is distinctly more common than it is here. Climatic factors must have something to do with it. They are not the whole thing, but they are one element. Of course the climate has not changed here.

NOTES ON THE PHYSICAL EXAMINATION

The heart signs up to the diastolic murmur are of no importance. The diastolic murmur is what we have been waiting for, and is the only thing worth attention.

What are the causes that make one pulse bigger than the other?

Students: Aneurysm. Congenital difference.

Dr. Cabot: If you have not been mistaken on this point you will be sometime. You will try to take somebody's pulse and be scared because you cannot feel it. You will think the patient is going to die. Then you will think, "He looks pretty well"; you feel for the pulse on the other side and find it good. It is generally due to a congenital difference in the position of the arteries, one deep and one superficial. I have been mistaken as to this so many times that I should like to warn you about it. I think that is what we have here.

Heart failure, which you see by the interval history he had, comes often from an attack of acute endocarditis. We used to think that people go along with good compensation until they commit some indiscretion of eating or exercising. We now know that people under precisely the same conditions and with no indiscretion will suddenly have heart failure like this coinciding with a fresh infection. The heart muscle feels the infection just as your leg muscles feel it when you have a bad sore throat. You do not like to use any of your muscles. Your muscles are run down, and so is your heart muscle. I think that if a patient is already on the edge of failure infection will throw him over the edge.

I am not at all sure that that story of precordial pain suggests coronary disease at his age. It has been proved by Dr. Capps of Chicago that patients do not have pain from endocarditis unless the mediastinum or other parts outside the precordia are involved.

If that report of liver dullness from the fifth to the eighth rib is true that would be a small liver; but it may not be true.

You would not expect him to get so well after being so sick before.

We notice again the association of inflammatory symptoms with circulatory symptoms. When he gets a rheumatism, then his heart fails, not when he is playing baseball, but when weakness comes to his heart from bacteria in his blood.

Imagine those tonsils still being in! There have been two admissions for heart disease and his tonsils are still in! That would be inconceivable today.

He had a rather small pulse pressure.

Dullness at the left upper front is queer. That could not possibly come from passive congestion. You have to have pneumonia, tuberculosis or infarct if that is true. One wonders if they got it wrong; perhaps it was a pericarditis with effusion. That gives dullness somewhere near that region, but not where they describe it. These are the three things to consider, pneumonia, tuberculosis and pericarditis. Of course we could not rest content with dullness and nothing else said about the lungs. We should want to know what the other signs are. My guess is that it was not due to lung disease or to the heart, but either to a pericardial effusion or to a mistake.

Waxy casts, if they really were present, generally mean serious kidney trouble. They are a rare thing. There is not anything else in that urine to make us think of kidney damage. But this is the sort of case in which we get glomerulonephritis. I should not be surprised, in view of that urine, if he had glomerulonephritis.

"Pneumococci predominant." That means nothing.

That temperature is very low. One wonders if he closed his mouth. I should not take it too seriously.

"Pressure signs developed in the left back." That is the lingo of 1910. It means that in the left back there was a patch of dullness and bronchial breathing resulting from pressure of fluid in the pericardial sac. It was often called the "pericardial pressure area". It makes you think you have pneumonia when you have not.

The note that there were signs of beginning consolidation April 5 is interesting. It may have been just the same thing we have been speaking of.

There is a possibility of nephritis, which we spoke of before.

The pain in the shoulder April 9 suggests that there may also have been some thrombosis, which also accompanies pericarditis.

The enlarged liver is enough to account for the abdominal distress. Anyone with the liver so swollen and the capsule so stretched will have abdominal tenderness.

This was in the good old days when we put on leeches. Most of you have never put on a leech. We were all trained how to put on a leech. We had to be taught how to make them bite. They relieved pain somewhat.

DIFFERENTIAL DIAGNOSIS

What are we going to find? Mitral stenosis,—we shall all agree on that. There is a good chance I think that he has acute endocarditis also. He has had three rheumatic attacks and has one now at the time of death. I believe it will be an acute endocarditis on top of an old fibrous calcareous process. Whether any valve besides the mitral will be involved I cannot tell. There will be hypertrophy of the right ventricle and hypertrophy and dilatation of the left auricle. This is the kind of case in which we may find a ball thrombus in the left auricular appendix, although of course we have no evidence of it. There will be passive congestion of all the organs. There is a good chance of glomerulonephritis. There is evidence of a pericarditis, which I am going to venture to say that he really had. What else have we? Possibly old or recent infarct of the lungs. He has had temperature, which would be accounted for by the pericarditis, so that we do not need to suppose pneumonia.

A STUDENT: When you say rheumatism do you mean rheumatic fever?

DR. CABOT: Yes.

A STUDENT: Do you think that dullness in the lung was caused by infarction?

DR. CABOT: I suppose it may have been. I have never been able to verify that post-mortem. Generally infarcts are not big enough to give dullness.

CLINICAL DIAGNOSIS (FROM HOSPITAL RECORD)

Acute rheumatism.
Endocarditis.
Pericarditis.

DR. RICHARD C. CABOT'S DIAGNOSIS

Rheumatic heart disease, mitral stenosis.
Acute endocarditis.
Recent pericarditis.
Hypertrophy of the right ventricle and hypertrophy and dilatation of the left auricle.
Possibly glomerulonephritis.
Chronic passive congestion of all the organs.
Possibly old or recent infarct of the lungs.

ANATOMIC DIAGNOSES

1. *Primary fatal lesions.*

Subacute pericarditis with effusion.
Fibrous endocarditis of the mitral valve.

2. *Secondary or terminal lesions.*

Septicemia, staphylococcus aureus.
Chronic passive congestion, general.
Excentric hypertrophy and dilatation of the heart.
Ascites.
Anasarca.
Slight glomerulonephritis.

DR. TRACY B. MALLORY: The pericardium was considerably distended with about 200 cubic centimeters of slightly turbid fluid. Both the visceral and parietal layers were covered with a somewhat shaggy fibrous exudate. The mitral valve showed a moderate degree of stenosis. The other valves were negative. The right ventricle showed a very slight degree of hypertrophy. There was very marked passive congestion of the liver. The kidneys showed a slight degree of glomerulonephritis. A blood culture at post-mortem showed staphylococcus aureus. No fresh vegetations were found on the heart valves.

CASE 14092

AN OBSCURE ABDOMINAL SITUATION

SURGICAL DEPARTMENT

An American seventy years old came to the Emergency Ward December 28 complaining of abdominal pain.

December 24 he was seized with cramp-like lower abdominal pain, more on the right, at first not very severe, but steadily increasing until on the day of admission his physician had to give morphia. The pain was more severe in the region of the right internal inguinal ring. He

had moderate nausea but no vomiting. An enema gave no results.

The family history was not obtained. The only past history recorded is of a large scrotal hernia of twenty-six years' duration.

Clinical examination showed a well nourished man lying quietly, somnolent, breathing irregularly and very slowly. The heart measurements are not recorded. Murmurs were present but are not described. Sounds and action normal. Artery walls palpable and tortuous. Blood pressure 140/90. Lungs normal. Abdomen markedly distended and tympanitic throughout. No fluid. Good normal peristalsis throughout. Marked right lower quadrant tenderness with some associated spasm. An irreducible right scrotal hernia almost the size of a football. Auscultation over the sac gave sounds of normal peristalsis. Prostate much enlarged. Pupils and reflexes normal.

The patient was catheterized. There was 20 ounces of residual. An inlying catheter was left. The later urine was bloody, amount not recorded, specific gravity 1.020, albumin and sugar present. Blood: 15,000 leukocytes.

A genito-urinary consultant reported that the prostate felt benign. He thought the patient would do better on catheter drainage if it could be kept working than he would if drained suprapubically. He advised pushing fluids by mouth and subpectorally.

The visiting surgeons differed as to the diagnosis. The patient was considered too ill to stand any operative procedure. His condition grew steadily worse. He became more comatose, with Cheyne-Stokes respiration. The blood sugar was 306, the non-protein nitrogen 117. Enemas gave no results. December 30 he died.

Discussion

BY EDWARD L. YOUNG, JR., M.D.

I have read the whole story because I recognized very quickly that this was a case where I was one of the visiting surgeons who "differed." I was the first of the visiting men to see this man. The only thing that I should like to change in this history is "abdomen markedly distended and tympanitic throughout". It was at no time when I saw him—and I saw him twice a day at least—distended "markedly". It was full, obviously a little fuller than it normally was.

The man came in, it is fair to say, with the diagnosis of strangulated hernia. It was a very large scrotal hernia, literally the size of a football, but by the use of a stethoscope we could demonstrate that it was not strangulated although it was irreducible. I do not think a surgeon has any right to use a stethoscope except on the abdomen, that is, in listening to the peristalsis of the intestines. It is of very great importance here, because it will tell the difference between hyperperistalsis of mechanical obstruction, complete absence of peristalsis in a paralytic obstruction, and the normal peristalsis.

Dr. Cabot: What do you hear, for instance, in the increased peristalsis?

Dr. Young: The increased gurgling which one would expect to go with the active peristaltic waves. Then in peritonitis cases following operation, complete silence. Nowhere do we get any sound or gurgle at all. Here there were normal peristaltic sounds to within a little less than twelve hours of his death. He did have very definite tenderness in the right lower quadrant. Considering that he was seventy years old, that when he came in he was very sick, I wondered if he might not have an acute appendix, atypical in appearance. But the evidence was not good enough to justify operation.

Enemas did not get results except on the afternoon of admission, when there was a certain amount of gas and very slight fecal result. On the basis of normal peristaltic sounds, slight result from enemas, and very little vomiting, we did not feel that the evidence of intestinal obstruction was sufficient to justify operation on that basis.

The twenty ounces of residual was a residual after the patient had voided. That and the large prostate brought up the question of back pressure in the kidney with a uremic condition. We have seen several cases here where an acute abdominal emergency has been simulated by an impending diabetic coma. The question came up, is this man suffering from a renal insufficiency and the resulting impending uremic coma? The non-protein nitrogen might or might not help us, because that can be upset, of course, from intestinal conditions as well as from kidney conditions. That is to say, the non-protein nitrogen will climb very rapidly in toxic conditions that come with intestinal obstruction and absorption.

We did not quite know where to place the blood sugar of 306.

Various outside men, medical and surgical, saw him, and no one was able to offer a diagnosis backed by sufficient evidence to warrant doing anything surgical. He went steadily downhill and died. I am perfectly certain that the appearance and the examination of the patient would add nothing to the picture as it is given here. Knowing as I do what the answer is, I should like to get the diagnosis from those here as to what they think this is.

A Physician: Intestinal obstruction.

Dr. Young: You base that on what?

A Physician: On an old gentleman with a hernia and nothing else to account for it.

Dr. Young: You are a medical man, who does not believe a surgeon has any right to hear anything through a stethoscope, even peristalsis; because I did hear peristalsis myself up to December 29.

DR. WILLIAM P. COUES: Could he not have an incomplete obstruction from his hernia—a man of that age—that began to give him those symptoms yet did not completely occlude the gut?

DR. CABOT: I do not know what he has. I should have agreed on not operating, but I should have agreed wholly because I did not know what was the matter.

DR. COUES: They could not get anything through the bowel?

DR. YOUNG: Aside from the first enema on December 28 in the afternoon. He died, I think, the morning of the 30th, so he really was not here very long. The afternoon of the 28th there was a small gas and fecal result, but other than that there was no result from enemas. But he did not get any more distended and the audible peristalsis did not get any more vigorous

DR. CABOT: You must remember some of the opinions expressed; don't you think you could tell us?

DR. YOUNG: No one had any definite diagnosis to offer. Dr. Jones felt that there probably was a condition in the abdomen which should have surgery, but he did not wish to do it himself and was unwilling to urge anyone else to do it. The medical men did not believe that the condition was due to uremia, but they had nothing constructive. Dr. Davis had no diagnosis and I had no diagnosis.

CLINICAL DIAGNOSIS (FROM HOSPITAL RECORD)

Hypertrophy of prostate.
Uremia.
Chronic nephritis.
Arteriosclerosis and hypertension.
Diabetes mellitus.
Incarcerated scrotal hernia.

DR. EDWARD L. YOUNG'S DIAGNOSIS

Not made.

ANATOMIC DIAGNOSES

1. *Primary fatal lesion.*

Infarction of the ileum.

2. *Secondary or terminal lesions.*

Hypertrophy of the prostate.
Early carcinoma of the prostate.
Acute cystitis.
Arteriosclerotic nephritis (early).

3. *Historical landmarks.*

Inguinal hernia.

DR. TRACY B. MALLORY: The man had a very big hernial sac, apparently a double hernia. One half the sac went down directly, the other half indirectly through the inguinal ring. The larger, direct portion of the sac contained three loops of lower ileum which were not very adherent. We could not quite see why the hernia was not reducible, except perhaps from its extreme size. The gut in the hernial sac showed smooth, glistening peritoneal surfaces but was somewhat discolored and reddish. All of the small intestines were reddened, with hemorrhagic mucosa and foul hemorrhagic content in the lumen. Microscopic examination showed necrosis and a fibrinous membrane replacing the mucosa. The necrosis of the gut was considerably more marked in certain loops of ileum outside the hernial sac than in those which were inside, and we were unable to find any explanation of its origin. I think perhaps the best bet is an undiscovered mesenteric thrombosis, but we were not able to identify it.

DR. CABOT: It was not the hernia?

DR. MALLORY: No. That is all we are sure of. Otherwise he showed a moderate degree of arteriosclerosis, a slightly hypertrophied heart, practically no passive congestion, rather small kidneys weighing 210 grams, with a moderate—not severe—degree of arteriosclerotic nephritis. The pelves were greatly dilated, the ureters, also the bladder immensely hypertrophied, with marked trabeculation, with walls six millimeters thick.

The prostate was the size of a baseball, all three lobes being enlarged, with several definite adenomatous areas as well as a diffuse hyperplasia. One of these areas showed a very small focus not more than three to four millimeters in diameter which I feel sure is a beginning carcinoma of the prostate.

DR. CABOT: What name are you giving to this condition in the intestine?

DR. MALLORY: I should call it infarction, but that is as far as I can go.

DR. CABOT: It is not intestinal obstruction?

DR. MALLORY: No.

DR. CABOT: There is no evidence that feces were blocked behind any particular point?

DR. MALLORY: The last four feet of ileum were collapsed and relatively normal. I think that there probably was some degree of obstruction above that point, that is, throughout the necrotic loops.

DR. CABOT: If he had succeeded in living longer what do you think would have happened? Would this have become gangrenous?

DR. MALLORY: Unquestionably, but it had not reached the definite point of gangrene as yet.

DR. YOUNG: Certainly I have never made a pre-operative diagnosis of mesenteric thrombosis correctly. I think it is a very puzzling thing in its symptomatology. Of course this clinically is the same thing, and that is not the sort of thing for which surgery could have given any help.

DR. COUES: I was interested to hear what you said about the surgeon and the stethoscope. Sometimes surgeons are still called upon outside the large cities where the internist is not at hand, and in the case of a child with appendici-

tis or empyema it seems as if some knowledge of stethoscopy might be of help.

DR. YOUNG: Undoubtedly it might, but I think what I do is to listen and look wise, and then depend entirely on my belief as to the presence or absence of appendicitis.

A SURGEON: Do you think the pain that he came in with may have ushered in the thrombosis?

DR. YOUNG: I do not know.

DR. CABOT: I suppose, judging from this case and others that come back to my memory, that we ought to erect a sort of tentative generalization in our minds that if an old man or woman who we have good reason to suppose has poor vessels comes in with abdominal trouble, even if we have no evidence of obstruction we ought to get the credit for wisdom by saying it may be a thrombosis, because vascular troubles are what we are looking for beyond anything else in old people.

DR. YOUNG: I had much that same thing the next week. I watched very carefully, and said, "It may be a mesenteric thrombosis; there is nothing at the minute to do surgically". Three days later she passed a gall-stone from the rectum the size of a golf ball, and my diagnosis went to glory.

A SURGEON: Is it true that the white count is usually very high,—thirty thousand sometimes?

DR. YOUNG: I do not know. The cases that we looked up after this were all high, but not so high as thirty thousand.

DR. CABOT: I do not see that you have anything to reproach yourself with in this case. Even when we know the outcome we cannot say that the clinical picture was there. It was not there.

DR. YOUNG: I think we guessed right about the surgery.

DR. CABOT: You know now that in what Dr. Mallory considers partial obstruction there may be a good deal of noise with the stethoscope. I suppose a good deal of the trouble is that we do not know what part of the intestine we are listening to. One part may be very quiet and the other noisy, and the second would cover up the first.

DR. YOUNG: Yes.

ANSWERS ON SMALLPOX AND VACCINATION

By J. P. LEAKE, *Surgeon, U. S. Public Health Service*

HOW OFTEN SHOULD ONE BE VACCINATED AGAINST SMALLPOX

"Ordinarily once in every five to ten years, so that a maximum protection is maintained without the inconvenience at any time of a reaction more severe than the immunity reaction, except for the original primary vaccinia. Vaccination of infants is attended with less general reaction and fewer complications than vaccination of older children, so that vaccination is advisable as soon after birth as practicable, preferably before teething. Unless tight undercloth-ing is worn over the arm, winter and spring are more suitable seasons than the warmer parts of the year. Though young babies often require a more potent vaccine than others to insure a successful effect, there are four advantages to be gained by vaccinating a child during infancy rather than waiting until later; first, the 'take' is apt to be milder and freer from the dangers of complications, such as tetanus; infantile vaccination usually gives rise to no inconvenience whatever; second, it tends to make the secondary vaccination, required at school age, a much milder affair than if the school vaccination were primary; third, protection against smallpox is gained for the preschool runabout years; fourth, the scar of an infantile vaccination fades more completely than scars of primary vaccinations performed later. Provided the subsequent revaccinations result in mild vaccinoids or immune reactions, as may be expected, one thereby secures lifelong complete protection against smallpox without any severe reaction at any time and with only a single inconspicuous scar.

"Immunity afforded by vaccination is lost by different individuals at different rates. The ability to ward off an attack of smallpox may be compared to proficiency in a foreign language. Such proficiency may be first acquired during early life and lost gradually, more rapidly in some individuals than in others. Some individuals need to be vaccinated more often than once in five years to maintain full protection and always to secure as the result of such vaccination merely an immunity reaction. Others may be vaccinated less frequently than once in twenty years and still maintain high immunity. A marked vaccinoid reaction indicates that too long a time has been allowed to elapse since the last vaccination with potent vaccine. It is a good plan to be revaccinated whenever one can be assured of a fully potent vaccine being used, so that the resulting reaction can be interpreted with certainty as showing a definite grade of immunity. On the basis of such a reaction, with the knowledge of the individual's previous vaccination history, one can often advise as to how frequently in the future that individual should be revaccinated."—*Bulletin Connecticut Department of Health.*

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The United States Civil Service Commission announces the following open competitive examination:

Senior Medical Technician (Anatomist)

Applications for senior medical technician (anatomist) must be on file with the Civil Service Commission at Washington, D. C., not later than May 8.

The examination is to fill a vacancy in the Surgeon General's Office, War Department, Washington, D. C., and vacancies cocurring in positions requiring similar qualifications.

The entrance salary is $1,860 a year.

Physicist (X-Ray), $3,800
Associate Physicist (X-Ray), $3,000
Assistant Physicist (X-Ray), $2,400
Physical Chemist (X-Ray), $3,800
Associate Physical Chemist (X-Ray), $3,000
Assistant Physical Chemist (X-Ray), $2,400

Full information may be obtained from the United States Civil Service Commission at Washnigton, D. C., or the secretary of the United States civil service board of examiners at the post office or customhouse in any city.

The New England
Journal of Medicine

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THE BOSTON MEDICAL AND SURGICAL JOURNAL

Established in 1828

Published by THE MASSACHUSETTS MEDICAL SOCIETY under the jurisdiction of the following-named committee:

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SUBSCRIPTION TERMS: *$6.00 per year in advance, postage paid for the United States, Canada $7.04 per year. $7.56 per year for all foreign countries belonging to the Postal Union.*

Material for early publication should be received not later than noon on Saturday. Orders for reprints must be sent to the Journal office, 126 Massachusetts Avenue.

The Journal does not hold itself responsible for statements made by any contributor.

Communications should be addressed to The New England Journal of Medicine, 126 Massachusetts Avenue, Boston, Mass.

LABORATORY SERVICE

THOSE in practice over thirty-five years were not taught as medical students much laboratory work except microscopy and urinalysis.

The development of the laboratory in recent years has been astounding. The value of certain work may be temporarily over-estimated but in time that which is not important will be discarded. That which is proved to be of unchallenged worth is soon firmly established. There is hardly a community in the State in which good X-Ray examinations by competent observers are not readily available at any time. In all the larger cities in addition to the X-Ray laboratories in the hospitals there are many physicians devoting their entire time to X-Ray work and radium therapy.

In several other branches the information gained from the laboratory has been less important and the need less general. In the bacteriological diagnosis of certain diseases, as for example diphtheria, the state and the municipalities have as a matter of protecting the public health established laboratories. The number of private laboratories established for chemical, bacteriological and other diagnostic work is relatively small. Yet there is need for such work as well as for work arising more particularly in connection with hospital patients as for example metabolism determinations, electrocardiograms and the examination of pathological specimens. Today the larger hospitals throughout the state are supplying more and more adequate laboratory service. And as the popularity of the hospital and the extent of its service increases the opportunity for the establishment of the private laboratory decreases.

In the development of laboratory service three considerations are important. Laboratory work of the importance indicated must be done only by those adequately trained and constantly abreast of modern knowledge. Access to adequate laboratory facilities should be as broad as possible. The expense of the service must be reasonable.

Certain routine work may be done by technicians properly supervised. Much of this work requires the broadest experience and best professional judgment. The best hope of securing these outside of the largest cities lies in such co-operation between health authorities and the hospital as will secure the ablest talent.

Laboratory service is today being made available to many physicians associated with hospitals actively or by courtesy. The further development of this service in both the larger cities and the smaller towns will be most helpful.

The expense of laboratory service is as a rule decreased by the volume of work done. The work can be done in general more satisfactorily in a central laboratory than by the individual physician. There is a tendency to make a fixed charge to all hospital patients for laboratory work, just as there is a fixed charge to all surgical patients in a hospital for the use of the operating room. There are many advantages in this system. Much very complicated and costly bookkeeping is avoided. There is an equalization of costs to patients. In general the expense of the laboratory work for medical patients balances the cost of the pathological examinations made for surgical patients. In a flat charge are commonly included blood, chemical, bacteriological, pathological, electrocardiographic and metabolic determinations. X-Ray examinations are commonly placed under a fixed charge.

The plan of a fixed laboratory charge has much to commend it. All surgical patients are entitled to a pathological examination of tissues removed. Medical patients are entitled to all the laboratory work which will aid their recovery. The ideals of our hospitals will thereby be raised. The community will be better served.

But let us not forget that the laboratory can never take the place of the careful study of the history and condition of the patient. The laboratory is often an indispensable aid for the clinician. The value of the service depends upon

the skill and accuracy with which it is performed. The best pathologists and roentgenologists today insist upon a knowledge of the history and clinical findings before they pass judgment upon pathological specimens or plates.

Several hospitals are extending the service of their laboratories along the lines suggested to benefit the communities served. The way is open through co-operation for a much wider laboratory service throughout the State.

PROGESS IN THE STUDY OF THE ACTION OF THE POSTERIOR LOBE OF THE PITUITARY

KAMM and his associates in the Research Laboratories of Parke, Davis & Co. have recently reported (*Journal Amer. Chem. Soc.* 50,573, 1928) a notable advance in the knowledge of the active principles of the posterior lobe of the pituitary body, an extract of which is official in the U. S. P. under the name Liquor Pituitarii (Solution of Pituitary). It has been known for some time that this extract has three actions, use of which is made in therapeutics: stimulation of the uterus, a rise of blood pressure and an antidiuretic effect most marked in cases of diabetes insipidus. There has been a difference of opinion as to whether all of these effects were due to the presence of one principle or to two or even more principles. The extraordinary activity of the preparation—a dilution of 1:20,000,000,000 having a marked effect upon the excised uterus—has made the investigation very difficult. Kamm and his associates have, by the use of very ingenious methods, effected a nearly complete separation of the active principles: one fraction being predominantly oxytocic and the other predominantly pressor.

As regards the antidiuretic action the authors concluded, "The diuretic-antidiuretic principle appears to be identical with the pressor principle". This view finds substantial confirmation in the communication by Gargle, Gilligan and Blumgart which appeared in the NEW ENGLAND JOURNAL OF MEDICINE, March 15th. These investigators, making careful quantitative observations upon patients with diabetes insipidus as well as upon normal men, found the pressor principle to markedly inhibit the excretion of water whereas the oxytocic fraction had but a slight effect.

The Detroit investigators remark: "As a result of this preliminary work the foundation is now laid for an investigation of the chemical nature of the separated hormones of the posterior lobe of the pituitary gland, together with a more exhaustive study of their pharmacological properties."

THE PRIZE FOR THE PREVENTION AND CURE OF CANCER

WILLIAM L. SAUNDERS some time since offered two prizes of $50,000 each, one for an effective means of preventing cancer and the other for a cure.

Mr. Saunders is an inventor and engineer and interested in a large business organization. His purpose in offering these prizes is reported to be to stimulate work which may materially aid in eradicating cancer. He believes that some new methods of approach must be devised other than those in vogue in studying the phenomena of disease at the present time and seems to have had in mind the possibility of some worth while investigations by persons other than physicians and pathologists. He has, however, no criticism of workers who are physicians or scientists associated with medicine and has expressed his appreciation of the interest shown by these workers.

About 3500 communications have been received in answer to his offer of which the majority have been sent by persons who are more interested in the award than in humanitarian purposes and many have been from uneducated persons and are ridiculous.

Only a small number of suggestions have been submitted by intelligent persons.

All suggestions which seem to have value will be submitted to a Board of Reference appointed by the American Society for the Control of Cancer. This board has authority to recommend a study of any proposition and may determine in what institutions the investigations may be made. The offer, which expired February 1, 1928, will not be renewed but Mr. Saunders has expressed interest in any real discovery with the possibility of bestowing a prize on any worthy claimant for valuable contributions to the cancer problem.

A report will be issued setting forth the findings of the Committee which will be distributed to medical libraries.

Unless the Committee finds some valuable material in the applications for the prize, the expectation of the medical profession will be verified for it is unreasonable to look for any solution of the cancer problems outside the fields of scientific research. It is probable we believe that when the discovery of the cause and cure of cancer shall have been made, it will not be because of the value of a prize.

THIS WEEK'S ISSUE

CONTAINS articles by the following named authors:

HOFBAUER, J. I. M.D. University of Konigsberg 1905. Associate Professor of Obstetrics, Johns Hopkins Univesity Medical School. His subject is: "Studies on the Etiology and the Treatment of Pyelitis in Pregnancy." Page 428. Address: Johns Hopkins Hospital, Baltimore, Md.

BARNEY, J. DELLINGER, A.B., M.D. Harvard Medical School, 1904. F.A.C.S. Chief of Service, Urological Dept., Massachusetts General

Hospital; Assistant Professor Genito-Urinary Surgery, Harvard Medical School; Consulting Urologist, Salem Hospital; Waltham Hospital; Cable Hospital, Ipswich; Gale Hospital, Haverhill; U. S. Marine Hospital, Chelsea; Massachusetts Eye and Ear Infirmary; Hunt Memorial Hospital, Danvers; Peterboro Hospital, Peterboro, N. H. His subject is: "The Present Status of the Treatment of Genital Tuberculosis in the Male." Page 442. Address: 87 Marlborough Street, Boston.

RAPOPORT, BORIS. M.D. Tufts Medical School, 1914. Anesthetist to the Beth Israel Hospital; Member of the American Association of Anaesthetists. His subject is: "Observations on Spinal Anesthesia with a Report of Cases." Page 447. Address: 270 Commonwealth Avenue, Boston.

CHURCHILL, EDWARD D. B.S., M.A., M.D. Harvard Medical School, 1920. Assistant Visiting Surgeon, Massachusetts General Hospital: Surgeon, Rutland State Sanatorium; Instructor in Surgery, Harvard Medical School. His subject is: "Progress in Thoracic Surgery for 1927." Page 453. Address: Massachusetts General Hospital, Boston.

The Massachusetts Medical Society

SECTION OF OBSTETRICS AND GYNECOLOGY

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Frederick J. Lynch, M.D., *Clerk*

What Are the Essentials of Post-Partum Care?

The practitioner should appreciate that the puerperium begins immediately following the delivery of the placenta. After the delivery of the child and the placenta, the patient should be covered well to prevent chilling of the surface of the body. There is a decided loss of heat after delivery, even without bleeding, and by the prevention of this loss, the patient may escape bronchial or pulmonary congestion or local inflammation.

The loss of blood predisposes to a loss of resistance and the development of septic conditions. Attention to this fact in every detail must be in the mind of the accoucheur. He is the responsible person and not the nurse. Immediate and constant attention must be given to the condition of the fundus and the amount of flow.

The appearance of pallor, opened mouth, or uncertain respirations should call for immediate investigation of the pulse and fundus. A rapid but good pulse may be the result of anaesthesia and yet a slow and feeble pulse may be consistent with undue bleeding.

The position of the fundus should be noted in regard to its smoothness and the degree of contraction, remembering that a well contracted uterus does not always mean no bleeding, and observation of the pads may show a decided bleeding from somewhere below the contractile portion of the uterus.

The physician should try to prevent loss of blood at any time during delivery or during the third stage. Injection of a standardized preparation of ergot or its alkaloid is better than the administration of the extract by mouth. After delivery of the placenta, pituitrin may be slightly more rapid in its action, but not as lasting as ergot. A combination of the two is the routine practice of some. There is an appreciable period of time before the effect of the injection is apparent and during this time the patient must be watched carefully.

Absolute rest should be obtained as soon as possible and with a minimum of rolling of the patient, in order to clean things up following the delivery. The necessity of avoiding any undue excitement in the first twenty-four hours cannot be over-estimated.

Proper drainage after the first day of recovery should be sought by frequent changing of the soiled pads, with thorough cleaning and a more or less inclined position in bed. The upper body of the patient in a semi-upright position, with hips low and knees slightly flexed to a comfortable position, places the patient in a much better position for good drainage than if in the prone position. For further relaxation the lateral position, or a position well over toward the anterior surface of the body is to be preferred to the absolutely prone position in bed.

The foregoing facts are important for the patient's welfare, but complete recovery without adding to the dangers of infection, can only be obtained by constant observance of the rules of asepsis during the period of convalescence.

Questions of a similar nature to the foregoing will be discussed in the JOURNAL each week. They may be addressed to the Clerk of the Committee, in care of the JOURNAL and will be answered by members of the Committee of the Section of Obstetrics and Gynecology.

BOSTON MEDICAL LIBRARY

THE INFLUENCE OF CHEMISTRY AND PHYSICS UPON MEDICINE

To all who seek to keep abreast of the present day trends of Bio-chemistry and Bio-physics as they are manifested in modern medical research and practice the address of *Professor Abel of Johns Hopkins University, delivered before the mid-west intersectional meeting of the American Chemical Society on May 27, 1927, will be of great interest.

He briefly tells us the origin and development of the unity of opinion with which the laws of physics and chemistry are in this day invoked in

*Science, Oct. 7th and 14th, Vol. LXVI, Nos. 1711 and 1712, pps. 307-319 and 337-346.

an attempt to understand the nature of various vital phenomena. To the old alchemists may be very well traced the origin of modern chemistry but there was necessarily a long period during which the nature of chemical elements and chemical compounds were being brought to light when there was a vast amount of humbug and misconception. This received its first real exposure at the hands of Paracelsus who lived from 1493 to 1541. He was an iconoclast and antagonized many of the physicians of his day because he ventured to harshly criticize the teachings of Galen and Avicenna. It is often, even in this day, the fate of the reformer to draw the fire of those not endowed with his vision.

He took the advanced position that the province of alchemy was to prepare medicines and not manufacture gold and furthermore that "in human beings there is a natural apothecary in which are found all things as in the world (macrocosm) good and bad, simples and composites, however named. As the outer world, the macrocosm, contains visible pharmacies and visible physicians so that in the microcosm, that is to say in the human being, there is present an invisible pharmacy and invisible physician, who produces, prescribes, dispenses and administers suitable remedies as occasion demands.—Let it be known to all men then that had not God created and placed in the bodies of men natural remedies and a natural physician, then, notwithstanding all the efforts of our physicians, not a single creature of earth would remain alive."

Reduced to terms more familiar to us Paracelsus taught there were "archaei" a species of invisible spirits occupying the body and operating upon the visible structures of the body enabling them to perform their functions. When an "archaeus" failed to work the particular structures or organs over which it presided ceased to function. What the essential difference between an "archaeus" and a "hormone" shall prove to be rests with the modern alchemists or bio-physicists. How comparable is the reasoning upon which these ideas are based to the concept of primitive man who regarded his ills as caused by entrance into his body of evil spirits (by what portals of entry he had no notion) and present day bacteriological theories of the etiology of disease! A mere embodiment of an evil spirit in a protoplasmic envelope ingested or inspired in the great majority of instances, as the case may be.

Up through the successive contribution of the iatro-chemists Sylvius, Van Helmont and many others, medicine and chemistry were advancing step by step the knowledge of the fundamental physiologic processes of respiration, secretion, circulation, etc. The latter portion of the 18th century and the first part of the 19th witnessed the identification of many "airs" or gasses which had puzzled the earlier students of physiologic chemistry, viz; oxygen, nitrogen, hydrogen as well as the composition of water.

Shortly after the first quarter of the 19th century ended, chemical synthesis was given prominence by Wöhler's work on the composition of the oil of bitter almonds, which imparted a great impetus to the study of organic chemical compounds. Studies in plant physiology in recent years have paralleled the researches above referred to, tending to make clearer the nature of physiological chemical and physical processes in living tissues.

As in the development of the science of anatomy investigators proceeded from the gross study of the structure of the body with comparative studies upon animals other than man to microscopic anatomy, so now the study of bio-chemical and bio-physical phenomena is concerned not with the grosser mass-reactions of the body along these lines but with the activities of particular cells. The central nervous system is no longer regarded as the sole coördinating agency governing the concerted functioning of the various organs of the body but there are other, additional methods of effecting these coördinations. The organs of internal secretion are intimately concerned in this. From them are distributed chemical units transmitted by the blood stream and called hormones, (from the Greek word meaning to stir up or incite,) which are intimately concerned in the promotion of normal physiological processes. Scientific studies upon nutrition are revealing the importance in human physiology of the substances in vegetable life which are comparable to the hormones of the human species. It is evident therefore that Paracelsus, 400 years ago, had glimpsed the future of Bio-chemistry when he said what he did in the quotation given above. During the week of April 23, there will be exhibited in Holmes Hall, Boston Medical Library, certain of the works of the iatro-chemists, Van Helmont, Sylvius and others together and later contributors to the building up of the present day sciences of Bio-chemistry and Bio-physics.

MISCELLANY

THE CANCER CAMPAIGN IN MASSACHUSETTS

On February 17 the Chairman of the Committee for the Prevention and Cure of Cancer of the Mass. Medical Society sent the following letter to the presidents of each one of the eighteen District Medical Societies:—

Dear Dr.:

On Monday, April 23, 1928, a campaign for the education of the public in regard to cancer will be started in Massachusetts under the direction of the Massachusetts Branch of the American Society for the Control of Cancer, the State Department of Public Health, and the Cancer Committee of the Massachusetts Medical Society.

The interest and co-operation of the medical profession of Massachusetts is of vital importance in this work, and its participation in the campaign is urgently desired.

Will you co-operate with us to the extent of

arranging a special meeting of the ..... District Medical Society during the last week of April on the subject of Cancer? It is proposed to invite certain eminent authorities on cancer from outside the state to address these meetings, and we shall be glad to assist in making arrangements for such an address in your District if you so desire.

It is possible that two or more neighboring Districts may wish to hold combined meetings for this purpose, and in cities where State-aided Cancer Clinics for the medical profession and addresses to public audiences may readily be given by these visitors.

We would assure you of the desire of this committee, as well as of the State Department of Public Health and the American Society for the Control of Cancer, to aid in any way open to them in making arrangements for these meetings.

We would respectfully request an early reply to this letter, telling us whether your society is in a position to co-operate with us in this campaign, and informing us in what ways we can be of assistance to you.

Respectfully yours,

R. B. GREENOUGH, *Chairman*,
F. G. BALCH,
G. H. BIGELOW,
KENDALL EMERSON,
P. E. TRUESDALE,
C. C. SIMMONS, *Secretary*.
Committee on Cancer Mass. Medical Society.

The response has been general as is indicated by the proposed meetings and clinics listed below:

THE DISTRICT MEDICAL SOCIETIES IN THE CANCER CAMPAIGN, APRIL 23-27, 1928

Barnstable—Thursday, April 26, Meeting at Hyannis, Dr. Merrill Champion.

Berkshire—Wednesday, April 25, Cancer Clinic at North Adams Hospital, Meeting and dinner, Dr. Robert B. Greenough.

Bristol North—Thursday, April 26, Taunton, Dr. Ernest M. Daland.

Bristol South—Friday, April 27, Meeting at the Public Library, New Bedford, Dr. Ernest M. Daland, speaker.

Essex North.

Essex South—Wednesday, April 25, Cancer clinic planned in co-operation with the Lynn Cancer Committee, April 25, Dr. Francis Carter Wood. Dinner and meeting in evening at Hotel Hawthorne, Salem.

Franklin—Meeting at Greenfield. Date and speaker to be announced.

Hampden—Monday, April 23, evening meeting at Hotel Kimball, Dr. Ernest Amory Codman, and Dr. John M. Birnie, speakers. Friday, April 27, lunch at Springfield, Dr. Howard Canning Taylor, guest. Special clinic at Wesson Hospital, Dr. Edward L. Young. Public Meeting at Academy of Medicine, Dr Edward L. Young.

Hampshire.

Middlesex East.

Middlesex North—Wednesday, April 25, Clinic at Lowell General Hospital in co-operation with Lowell Cancer Committee, Dr. Francis Carter Wood, guest.

Middlesex South—Friday, April 27, 8:15, meeting at Boston Medical Library, will unite with Suffolk and Norfolk Districts, Dr. Howard Canning Taylor.

Norfolk—Friday, April 27, 8:15, meeting at Boston Medical Library, will unite with Suffolk and Middlesex South Districts, Dr. Howard Canning Taylor speaker.

Norfolk South—Though it was found impracticable to hold a meeting during the week of April 23, consideration was given to the subject of cancer at the April 5 meeting, when Dr. Channing Simmons was the speaker.

Plymouth.

Suffolk—Friday, April 27, 8:15, meeting at Boston Medical Library, will unite with Norfolk and Middlesex District Medical Societies, Dr. Howard Canning Taylor, speaker.

Worcester—Tuesday, April 24, A cancer clinic at Memorial Hospital will be held at 4:30, Dr. Joseph Colt Bloodgood will be consultant. On the same evening a mass meeting will be held at which the Mayor of the city and Dr. Bloodgood will speak.

Worcester North, Tuesday, April 24, annual meeting of this Society falls on April 24. After a business session the meeting will adjourn to Worcester for the clinic and mass meeting as mentioned above.

A special cancer clinic will also be held at the Pondville Hospital on Tuesday, April 24, from 2 to 3 P. M., which all members of the medical profession are invited to attend. This clinic will be conducted by the visiting staff of the Hospital, Dr. Joseph C. Bloodgood acting as consultant. Only selected cases will be shown.

Many public meetings are being planned for the cancer campaign besides the opening one in Boston at Symphony Hall where the Governor and Mayor Nichols will offer greetings and Dr. W. A. Evans and Dr. Richard C. Cabot will speak.

All physicians are invited to attend a luncheon at the Hotel Statler on Monday, April 23, at one o'clock. Among the guests will be W. A. Evans, M.D., and Arnold H. Kegel, M.D., both of Chicago. Plans for the Campaign will be the chief topic of discussion at this luncheon.

OBITUARY

IN MEMORIAM

PTOLEMY O'MEARA EDSON*

1833—1928

"This is the Happy Warrior: this is he
Whom every man in arms should wish to be."

His tolerance too broad for any creed,
His heart too merciful to be bound down
By any law save love, which has no frown
For much the world condemns, and but takes heed
Of brave endeavor—look and word and deed
Stamp him "God's nobleman," and that renown
Above all others shall his life-work crown,
Of having helped the helpless in their need.
And when the Present shall become the Past,
And the blurred visions now beyond our ken
For him are clear—and Rest has softly cast
Her poppied hair athwart his eyelids, then
Honored the memory of his name shall last—
An upright man who loved his fellowmen.

FRANCES BARTLETT.

*This sonnet, whose prophecy now has come true, was written a few years ago.

RECENT DEATHS

KELLY—Dr. John Michael Kelly, a Fellow of the Massachusetts Medical Society, died at his home in Dorchester, April 7, 1928, of heart disease, aged 49.

He was born in Dorchester, October 22, 1878, was educated in the public schools, at Boston Latin School and at Boston College, where he received an A.B. in 1899. His M.D. was from Tufts College Medical School in 1905. After serving as house officer at the Carney Hospital, where he was in the tuberculosis department, he settled in Dorchester. He was a Fellow of the American Medical Association. He was unmarried.

SHEA—Dr. Augustus W. Shea of Nashua, N. H., died April 10 at the Charlesgate Hospital, Cambridge. Complete notice will appear in the New Hampshire section of the Journal May 3.

CORRESPONDENCE

THE NURSING PROBLEM

Ring Sanatorium and Hospital, Inc.,
Arlington Heights, Massachusetts,
April 7, 1928.

Editor, New England Journal of Medicine:

I want to compliment the writer of the editorial, "Some Features of the Nursing Situation," in the January 12 number. It shows an excellent grasp of the nursing problem.

The New York standards are doing for nursing just what they and the A. M. A. did for medicine. The result of the latter attitude was to develop a smaller number of high grade physicians so that many of our country towns are now suffering for proper medical care and the same will soon be true of nurses if such a standard is generally adopted.

Years ago at the Ring Sanatorium we felt the lack of fitness of the average graduate nurse for our work. She had little understanding of the chronic patient. Since such patients had no wounds to dress and no temperatures to take she felt that they were not ill. She utterly failed to get the psychological point of view. On the other hand we were conscious that the average attendant had too little knowledge of illness and less ethics.

In 1905 we offered a two years' course in chronic nursing. The course included Anatomy, Physiology, General Nursing and Physiotherapy. Courses were added each year until in 1910 we had a well organized school.

When the State Board of nursing was organized we naturally wanted to give our students the advantage of registration and added the third year, affiliating with general hospitals. A nurses' home was built in accord with the requirements and the curriculum brought up to the Massachusetts standard. In addition, psychology, normal and abnormal, psychiatry and a didactic and clinical course in physiotherapy are given.

Our school has always been accepted by the State Board and we have many graduates who have their R. N. However, the continued addition of courses in specialties and the demand for special pediatric training have added a great burden and are in my judgment of questionable value to the public.

I am coming to believe that the need of the public is for a less highly trained but more practical and lower priced nurse. It would seem wiser to have three grades of nurses, (1) The Registered Nurse of not less than one year college preparation, (2) The graduate nurse of not less than one year high school and a two-year nursing course in a hospital and (3) the attendant nurse who should have at least one year of practical work in a hospital.

If the State Board and State Nurses' Association would standardize these grades and we and the public knew about the amount of training and skill they represented the present confusion would be cleared up for the public—the physician and the hospital superintendent. Also, young women entering the nursing field would know just where they might fit—and not aspire to a grade for which they were not prepared.

Very truly yours,

Arthur H. Ring.

COMMENTS ON THE ART OF MEDICINE

Editor of the New England Journal of Medicine:

All is not well with the Art of Medicine. It is axiomatic that all human institutions, being fallible and of uncertain tenure, have defects. The essential thing is that this fact receive recognition and early and appropriate treatment in order that defects may not assume the proportions of abuses which in time may easily result in central decay. So notable have been recent scientific achievements in medicine that, flushed with triumph, it has become insensible to the dangers that threaten the canons of its culture. It is therefore not only heartening but salutary that this journal has consented to the use of its columns for the temperate criticism and debate of problems intrinsic to medical polity.

Constructive criticism, so called, has its peculiar values but the unembarrassed expression of any well founded strictures should be regarded in the medical, as in the commercial world, as evidence of organic health. At least there is life in the organization that welcomes it, and all well-tempered criticism is stimulating, and thus of potential fruitfulness. Many an observer may sense defects in a structure without being able or willing to accept responsibility for the technique of its correction. To close the door on such an one is to invite disaffection, insurrection and spiritual death.

The art of medicine cannot today flourish and close its eyes to the fact that certain changes have been imposed and perhaps superimposed upon it by an intensively mechanized and commercialized world. This is a new, an unwelcome even a threatening situation. The burden thus suddenly thrust upon an ancient, an honorable, an indispensable art is grievous, and fraught with many perplexities. The people under new and dislocating conditions must be ministered to as duty decrees, and yet, to serve effectively, the organic and economic integrity of the profession must be preserved. This situation not only presents new problems of great complexity but progress and solidarity require that they be solved by new formulae. A simple parochial problem has within a generation assumed cosmic proportions, and aspects resembling an algebraic equation.

Its solution rests within the profession. Is the profession equal to it? That it is urgent is attested by ominous rumblings. Its successful treatment will test the validities of medical organization and tax profoundly the wisdom and resourcefulness of the best workers in the profession. Moreover if prompt, adequate and permanent relief is to be attained every angle must be searchingly examined and this can

only be compassed when each member has access to a medium for the expression of his or her observations.

Yours respectfully,

A. E. P. ROCKWELL.

248 Main St., Worcester, Mass.

NEWS ITEM

NORTH SHORE MEDICAL FRATERNITY — Dr. Max Ritvo and Dr. Mark Joress addressed the members of the North Shore Medical Fraternity on Diseases of the Lungs. Dr. Ritvo's talk was on X-ray findings in lung conditions.

Dr. Saul Berman addressed the members of the North Shore Medical Fraternity on February 27, 1928, on Toxemias of Pregnancy.

Dr. Louis I. Skirball addressed the members of the North Shore Medical Fraternity on March 20, 1928, on Malnutrition of Children.

ELLIS MICHELSON, M.D.

NOTICES

DENTISTRY AND MEDICINE

A meeting of unusual interest is to be held at the Hotel Statler during the Convention of the Massachusetts Dental Society, on Thursday, May 10th, from 2 to 5 P. M., when the Section on Children's Dentistry meets to listen to the address of Dr. C. N. Johnson on "The Highest Function of the Dentist". A Clinic will follow his address.

The very rapid strides made in preventive work in dentistry in recent years and the recognition of the relation of oral health to general health makes this an opportunity to hear from a recognized authority the latest views regarding the work of the dentist in maintaining health. Physicians are invited to this meeting. It is hoped that many may attend. There must be closer coöperation of dentist and physician if each is to do his full duty to his patient.

CLINIC AT THE PALMER MEMORIAL HOSPITAL

Dr. Joseph C. Bloodgood of Baltimore will hold a clinic at the Palmer Memorial Hospital, Tuesday morning, April 24th, at 9 o'clock, emphasizing the early diagnosis and treatment of malignant disease. Physicians are cordially invited. This clinic is to be held in connection with the Cancer Week program.

BOSTON MEDICAL HISTORY CLUB

The Boston Medical History Club, in conjunction with the Harvard Medical Society, will meet on Tuesday, April 24th, at the Peter Bent Brigham Hospital, at 8:15 P. M.

Program — "William Harvey," by Dr. Archibald Malloch, Librarian, New York Academy of Medicine.

Physicians and medical students cordially invited to attend.

REPORTS AND NOTICES OF MEETINGS

WACHUSETT MEDICAL SOCIETY

The regular monthly meeting of the Wachusett Medical Society was held at the Holden Hospital, Holden, April 4, 1928. Dr. Charles F. Ayers of Worcester read a paper entitled, "Diagnosis and Treatment of Chronic Joint Conditions with Special Reference to Tuberculosis."

WILLIAM B. DAVIDSON, *Secretary.*

THE NEW HAMPSHIRE SURGICAL CLUB

The thirtieth semi-annual meeting of the New Hampshire Surgical Club will be held at the Elliot Hospital Manchester, N. H., Tuesday, April the 24th, 1928.

Beginning at 10 a. m. a Clinic will be held in the operating room of the hospital. This will be followed by a lunch in the lecture room of the hospital and at 1:30 p. m. a literary program will be presented. The following committee from the Elliot Hospital Staff have been appointed to arrange for the clinic: Dr. D. C. Norton, chairman, Dr. David W. Parker, Dr. George Dwinell. The officers of the Club are: President, Dr. E. M. Miller, Woodsville, N. H.; Vice-President, Dr. D. C. Norton, Manchester, N. H.; Secretary-Treasurer, Dr. John F. Holmes, Manchester, N. H.; Executive Committee: President, Secretary-Treasurer, Ex-officio; Dr. J. F. Gile, Hanover, N. H.; Dr. Carlton R. Metcalf, Concord, N. H.; Dr. Timothy F. Rock, Nashua, N. H.

SUFFOLK DISTRICT MEDICAL SOCIETY

SPECIAL MEETING

Boston Medical Library, John Ware Hall, Friday, April 27, 1928, at 8:15 P. M.

"The Work of the American Society for the Control of Cancer," Dr. Howard C. Taylor, New York City.

Discussion will be opened by Drs. Channing C. Simmons, Leland S. McKittrick and Shields Warren.

This meeting is planned during Cancer Week to give the physicians an opportunity to hear from Dr. Taylor, one of the foremost authorities in the United States, of the fight which is being waged against this dreaded disease. Dr. Taylor is President of the American Society for the Control of Cancer, Professor of Clinical Gynecology at Columbia University and Professor of Gynecology at the Roosevelt Hospital. The subject is one of wide general interest and importance. It is hoped that there will be a large attendance at this meeting. All physicians are cordially invited.

Light refreshments after the meeting.

ELLIOTT P. JOSLIN, M.D., *President,*
ARTHUR H. CROSBIE, M.D., *Secretary.*

MASSACHUSETTS TUBERCULOSIS LEAGUE

At Hotel Kimball, Springfield, Massachusetts, on Monday, April 30, the fourteenth Annual Meeting of the Massachusetts Tuberculosis League will be held. Dr. Kendall Emerson, President, will preside at the session which will begin at 10:30 a. m. Daylight Saving Time. Invitations have been extended to physicians, nurses, health and social workers in Maine, New Hampshire, Vermont, Connecticut, Rhode Island, and Eastern New York as well as those in the Commonwealth.

Dr. William Charles White of the United States Public Health Service, who is charge of the research work for the National Tuberculosis Association being carried on in eleven university laboratories in the United States, will speak on "The Responsibility and

Future of Tuberculosis Research in the United States."

Dr. John M. Birnie, President of the Massachusetts Medical Society, will speak on the work of the Society in its relations to volunteer tuberculosis work.

Mr. George J. Nelbach, Executive Secretary of the State Tuberculosis and Public Health Committee of New York State, will speak on "The Progress of Volunteer Health Work in the Empire State."

Miss Anna W. Johnson, Educational Secretary of the League, Frank Kiernan, Executive Secretary of the League, and Arthur Drinkwater, Treasurer, will give their annual reports.

Dr. White is Chairman of the Medical Research Committee of the National Tuberculosis Association and Vice-Chairman of the Division of Medical Sciences of the National Research Council.

Dr. White received his degree as a Doctor of Medicine from the University of Toronto and was later appointed a Fellow at Johns Hopkins University at Baltimore. Dr. White carried on post-graduate work at the Universities of Leipsig and Heidelberg.

For a time he occupied the Chair of Professor of Pathology at Purdue University, Indianapolis, and later was appointed to Professor of Neuro-Anatomy and Clinic Psychiatry at Indiana University. Following this he was invited to become Associate Professor of Medicine at the University of Pittsburgh. During the war he entered the service of the American Red Cross and was selected to head the unit which began a three years' service in France and Italy in 1917. Dr. White was Medical Director of the Tuberculosis Association of Pittsburgh for a number of years and Director of the R. B. Mellon Research Laboratory.

He is a member of the Association of American Physicians, the American Climatological and Clinical Association, and the National Tuberculosis Association. For his services in Italy he received from the King the Order of Commander of the Crown, and from the Government of Serbia the Order of Saint Sava.

Dr. White is the author of "The New Basis for Social Progress" and "Business of a City's Health."

Mr. George J. Nelbach, Executive Secretary of the State Tuberculosis and Public Health Committee of New York State, who will speak at the luncheon meeting, has been engaged in tuberculosis work for twenty-one years. Under his leadership, the volunteer tuberculosis work in New York State has grown from feeble beginnings, with scattered local committees largely carrying on programs of unrelated health activities, until today New York State stands as one of the leaders in the nation for a well-co-ordinated, harmonious plan in which fifty-seven county organizations, working in close co-operation with the State Committee and the Public Health Authorities, are carrying on from year to year a growing program along sound tuberculosis and public health lines.

Dr. Henry D. Chadwick, President, and Mr. Frederic Edwards, Executive Secertary, of the Hampden County Tuberculosis and Public Health Association are in charge of local arrangements in Springfield for the meeting.

Following the luncheon meeting, the company will be transported to Westfield State Sanatorium where inspection will be made of the plant and a talk will be given by Dr. Chadwick. Dr. George H. Bigelow, State Commissioner of Public Health, will welcome the visitors to the Institution.

MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH

The regular meeting and luncheon of the Massachusetts Association of Boards of Health will be held in Hotel Bellevue, Beacon Street, Boston, on Thursday, April 26th, at 1 p. m. Luncheon $1.50 per person.

PROGRAM

Paper: "Pneumonia Quarantine in Pittsburgh," by Dr. Philip E. Marks, Superintendent Bureau of Infectious Diseases, Pittsburgh, Penn. Discussion by Dr. Hans Zinnser, Professor of Bacteriology and Immunity, Harvard Medical School.

STEPHEN L. MALONEY, *Secretary.*

Note.—The importance of this subject is emphasized by the experiment of Pittsburgh where existed the highest death-rate from pneumonia of any large city in the country. Since the enforcement of quarantine measures there has been a steady decline in the mortality from the disease. We are fortunate in securing Dr. Marks to tell us how pneumonia is handled in Pittsburgh.

CONFERENCE ON RHEUMATIC DISEASES

TO BE HELD AT BATH, ENGLAND, THURSDAY AND FRIDAY, MAY 10TH AND 11TH, 1928

President of the Conference:

Sir George Newman, K.C.B., Hon. D.C.L., LL.D., M.D., F.R.C.P., D.P.H. Chief Medical Officer, Ministry of Health.

Presidents of the Sessions:

The Right Hon. Lord Dawson of Penn, G.C.V.O., K.C.B., K.C.M.G., Hon. LL.D., M.D., F.R.C.P., Physician to H. M. The King.

Sir Humphrey Rolleston, Bt., K.C.B., Hon. D.Sc., D.C.L., LL.D., M.D., F.R.C.P., Physician to H. M. The King, Regius Professor of Physic, University of Cambridge.

Sir E. Farquhar Buzzard, K.C.V.O., M.A., F.R.C.P., Physician to H. M. The King, Regius Professor of Medicine, University of Oxford.

Honorary Vice Presidents:

Sir John Rose Bradford, K.C.M.G., C.B., C.B.E., M.D., D.Sc., F.R.C.P.; President, Royal College of Physicians.

R. A. Fleming, Esq., M.A., M.D., F.R.C.P.; President, Royal College of Physicians, Edinburgh.

W. A. Winter, Esq., M.D., F.R.C.P.I.; President, Royal College of Physicians of Ireland.

Sir James Berry, F.R.C.S., Hon. D.C.L.; President, Royal Society of Medicine.

Sir Robert Philip, Hon. LL.D., M.A., M.D., F.R.C.P., Hon. F.R.C.S.; President, British Medical Association.

Sir Walter Morley Fletcher, K.B.E., Hon. D.Sc., Hon. LL.D., M.A., M.D., F.R.C.P.; Secretary, Medical Research Council, London.

R. Fortescue Fox, Esq., M.D., F.R.C.P.; Chairman, International Society of Medical Hydrology.

Organizing Committee:

F. G. Thomson, M.A., M.D., F.R.C.P., Chairman.

Rupert Waterhouse, M.D., M.R.C.P.

R. C. Gordon, M.D., D.Sc., F.R.C.P.E.

Vincent Coates, M.C., M.A., M.D., M.R.C.P., Hon. Medical Secretary, 10, Circus, Bath.

John Hatton, Hon. Organizing Secretary, The Pump Room, Bath.

Scope of Discussion:

(1) Rheumatic Fever:
  (a) Acute.
  (b) Sub-acute.
(2) Chronic Multiple Arthritis.
(3) Fibrositis.
(4) Degenerative Arthritis.

First Session—Social Aspects.
Second Session—Causation.
Third Session—Treatment.

Opening of the Conference: Thursday, May 10th, at 2:30 p. m.

Civic Welcome by the Mayor of Bath (Alderman Cedric Chivers, J.P.).
President's Address by Sir George Newman, K.C.B.

First Session. Social Aspects. Thursday, May 10th, 3 p. m. to 6 p. m.

President: The Right Hon. Lord Dawson of Penn, G.C.V.O., K.C.B., K.C.M.G., Hon. LL.D., M.D., F.R.C.P., Physician to H. M. The King.

Speakers and Subjects

Mr. W. A. Appleton, C.B.E.
Industrial Rheumatism from the Standpoint of the Approved Societies.
Dr. H. B. Brackenbury
Organization of Medical Treatment of Industrial Rheumatism.
Dr. J. Alison Glover, O.B.E.
General Incidence of Rheumatic Diseases.
Sir Walter S. Kinnear, K.B.E.
Cost to the Country of Industrial Rheumatism.
Dr. Reginald H. Miller
Influence of Environment in Rheumatic Infection in Childhood.
Dr. J. Van Breemen (Holland)
Types of Rheumatic Disorders Most Prevalent in Holland.

Second Session. Causation. Friday, May 11th, 10 a. m. to 1 p. m.

President: Sir Humphrey Rolleston, Bt., K.C.B., Hon. D.Sc., D.C.L., LL.D., M.D., F.R.C.P., Physician to H. M. The King, Regius Professor of Physic, University of Cambridge.

Speakers and Subjects

Dr. W. Langdon Brown
Endocrine Factor in Polyarthritis.
Dr. Carey F. Coombs
Rheumatic Infection in Children.
Mr. A. G. Timbrell Fisher, M.C.
Pathology of Infective Arthritis.
Dr. A. Dingwall Fordyce
Predisposing Factors in Rheumatic Infection in Childhood.
Dr. Geoffrey Hadfield
Pathology of Tissue Reaction in Rheumatic Disorders.
Professor T. Hare
Pathology of Infective Arthritis in Animals.
Dr. Gunnar Kahlmeter (Sweden)
Sedimentation of the Enthrocytes in Rheumatic Conditions.
Dr. Ralph Pemberton (U. S. A.)
Local Tissue, Sub-oxidation in Infective Arthritis.
Professor R. Stockman
Panniculitis and Arthritis.
Dr. Homer F. Swift (U. S. A.)
Rheumatic Fever.
Professor C. W. Vining
The Pre-rheumatic Child.
Dr. Mathieu-Dierre Weif (Paris)
Rheumatic Fever.

Third Session. Treatment. Friday, May 11th, 3 p. m. to 6 p. m.

President: Sir E. Farquhar Buzzard, K.C.V.O., M.A., M.D., F.R.C.P., Physician to H. M. The King, Regius Professor of Medicine, University of Oxford.

Speakers and Subjects

Dr. Isadore Gunzburg (Antwerp)
Physical Treatment in Rheumatic Diseases.
Dr. R. L. J. Llewellyn
Preventive Treatment of Chronic Rheumatic Diseases.
Dr. J. Campbell McClure
Physical Treatment.
Mr. C. Max Page, D.S.O.
Surgical Treatment in Degenerative Arthritis.
Dr. F. J. Poynton
Acute Rheumatic Infection in Childhood.
Dr. A. P. Thomson, M.C.
Institutional Treatment of the Rheumatic Child.
Sir William H. Willcox, K.C.I.E., C.B., C.M.G.
Treatment of Underlying Infection, Including Vaccines, Their Use and Abuse.

At the end of each Session it is hoped that there will be a discussion. Those desirous of taking part should send their names and the subject upon which they wish to speak to Dr. Vincent Coates, Hon. Medical Secretary, 10, Circus, Bath, not later than May 5th.

In connection with the Annual Meeting of the Balneological Section of the Royal Society of Medicine, which is to be held at Bath to follow the Conference on Rheumatic Diseases, on Saturday, May 12th, from 9:30 to 11 at the Hot Mineral Baths, there will be Demonstrations of Treatment on appropriate cases; from 11 to 12:15, at the Royal Mineral Water Hospital, Demonstrations of Clinical Material by Physicians of the Hospital.

These Demonstrations will be open to all those attending the Conference on Rheumatic Diseases.

Civic Reception.

On Thursday evening there will be a Reception by the Mayor of Bath (Alderman Cedric Chivers) and the Mayoress of Bath (Madame Sarah Grand) at the Pump Room and Roman Baths.
Academic Dress.

Railway Arrangements.

To those intending to be present at the Conference the railway companies have agreed to issue return tickets at the cost of a single fare and a third. The concession applies to all railway companies in Great Britain (but not in Ireland) and the tickets will be available from May 9th to 14th. They will be issued *only upon production of a special voucher*, signed by the Hon. Organizing Secretary.

Garage Accommodation.

A list of convenient garages will be sent on application.

Hotel Accommodation.

The Hotels have quoted special terms for those attending the Conference. There is a considerable amount of hotel accommodation in Bath, but owing to the demand for rooms during May, arrangements for accommodation should be made at once. These

special terms can only be obtained on application to the hotels *through the Conference Ticket.* The special railway and hotel arrangements will also apply to ladies accompanying those attending the Conference. The Conference Tickets, including railway voucher, hotel application form, and admission ticket to the Sessions, with list of hotels and special terms will be sent on application to the Hon. Organizing Secretary, Mr. John Hatton, The Pump Room, Bath. In order that arrangements may be made for the entertainment of ladies accompanying those attending the Conference, the Organizing Secretary would be glad to be notified of their names in advance, and of any special features of Bath in which they may be particularly interested.

Delegates from Local Authorities.

The Minister of Health (England and Wales), the Scottish Board of Health; the Ministry of Home Affairs, Northern Ireland; and the Department of Local Government and Public Health, Irish Free State, will favorably consider applications for the payment of expenses from Local Authorities having a special interest in the Conference and desiring to be represented by their Medical Officer of Health or School Medical Officer.

Hon. Medical Secretary:
Vincent Coates, M.C., M.A., M.D., M.C.R.P.,
10, Circus, Bath, England. Tel. 779.

Hon. Organizing Secretary:
John Hatton,
The Pump Room, Bath, England. Tel. 9.

AMERICAN CLIMATOLOGICAL AND CLINICAL ASSOCIATION

FORTY-FIFTH ANNUAL MEETING

AT WASHINGTON, D. C.

TUESDAY AND WEDNESDAY, MAY 1, 2, 1928

PRELIMINARY PROGRAM. SUBJECT TO CHANGE

Part of the Congress of American Physicians and Surgeons

President, Joseph H. Pratt, M. D., Boston, Mass.

Vice-Presidents, George D. Porter, M.D., Toronto, Ontario, Can.; James S. McLester, M.D., Birmingham, Ala.

Secretary and Treasurer, Arthur K. Stone, M.D., Framingham Centre, Mass.

Recorder, Cleaveland Floyd, M.D., Boston, Mass.

MAY 1-2

The Headquarters of the Association will be at the Mayflower Hotel, Washington, D. C.

Meetings will be held in District of Columbia Medical Society Building, 1817 M Street.

PROGRAM OF SCIENTIFIC SESSIONS

TUESDAY, MAY 1, 1928, 10 A. M.

President's Address, Dr. Joseph H. Pratt.

MEMORIAL NOTICES

Dr. Thomas D. Coleman, by William LeRoy Dunn; Dr. Bertram H. Waters, by J. Burns Amberson, Jr.

SCIENTIFIC SESSION

1. The Effect of Climate in the Treatment of Pulmonary Tuberculosis. Dr. James A. Miller, New York.
2. The Duration of Life in Pulmonary Tuberculosis with Cavity. Dr. Harry L. Barnes, Wallum Lake, R. I.
3. The Excursion of the Costal Margins in Health and Disease. Dr. Harry A. Bray, Ray Brook, N. Y.
4. Intrapleural Pressure in Massive Collapse of the Lung with Report of Cases By invitation. Charles C. Habliston, M. D., Baltimore, Md.
5. Syphilis of the Lungs. Dr Lawrason Brown, Saranac Lake, N. Y.
6. The Use of Qualitative Diagnosis of Pulmonary Tuberculosis. Dr. J. Burns Amberson, Jr., Loomis, N. Y.

BUSINESS MEETING, 12:30 P.M.

TUESDAY, MAY 1, 1928, 2:30 P. M.

7. Prognosis (with special reference to etiology) and Treatment in Auricular Fibrillation. Dr. William D. Stroud, Philadelphia.
8. Renal Function in Arterial Hypertension. Dr. Ralph H. Major, Kansas City.
9. Coronary Occlusion in Buerger's Disease. Dr. Isaac I. Lemann, New Orleans.
10. The Hypothesis of Mechanical Stimulation as an Explanation of Certain A-V and V-A Sequences During Heart Block (Lantern). Dr. Charles C. Wolforth and Dr. Thomas N. McMillan, Philadelphia.
11. Further Studies on the Effect of Deep X-ray on the Heart. Dr. F. Janney Smith, Dr. F. W. Hartman, Dr. Adolph Bollinger and Dr. H. P. Doub, Detroit.
12. Chronic Nasal Infection and Chronic Bronchopulmonary Disease. Dr. Logan Clendening, Kansas City.

TUESDAY, MAY 1, 8 P. M.

Congress Meeting. Address, Theobald Smith, M.D.

WEDNESDAY, MAY 2, 1928, 9.30 A. M.

13. Recording of Physical Findings. Dr. Charles L. Minor, Asheville, N. C.
14. The Incidence and Severity of Asthma According to the Season of the Year. By invitation. Francis M. Rackemann, M.D., Boston.
15. Scurvy with Reference Especially to Adults. Dr. George C. Shattuck, Boston.
16. After Six Years with Insulin. Dr. H. Rawle Geyelin, New York.
17. Spontaneous Insulin Shock (Lantern). Dr Thomas P. Sprunt and J. H. Trescher, M.D., Baltimore.
18. The Radical Cure of Simple Obesity by Dietary Measures Alone. Dr. Frank A. Evans, Pittsburgh, Pa.

To be read by title or interpolated if time permits:

19. The Incidence of Tuberculous Infection in School Children in Massachusetts. Dr. Henry D. Chadwick, Westfield, Mass.

BUSINESS SESSION AT 12 O'CLOCK

Election of Officers and New Members.

WEDNESDAY, MAY 2, 2 P. M.

Meeting of the Congress of American Physicians and Surgeons.

NOTES

The headquarters of the Association and of the Congress will be at the Mayflower Hotel, Connecticut Avenue, Washington, D. C.

The meetings of the American Climatological and Clinical Association will be held at the District of Columbia Medical Society Building, 1718 M Street.

This is about two minutes' walk from the Mayflower Hotel.

Dr. and Mrs. Charles W. Richardson as usual extend their hospitality to the members of the Association and their wives at luncheon on Wednesday, May 2, at 1 P. M., at 1337 Connecticut Avenue.

The Annual Dinner will be held at the Metropolitan Club on Wednesday at 7 P. M. (informal dress). It is hoped that President Livingston Farrand of Cornell will be present.

For information regarding reduced railroad fares for members and their families, see circular of the Congress which has been sent to all members.

PROGRAM OF PETER BENT BRIGHAM HOSPITAL REUNION

Thursday, April 26th

In Amphitheatre

11:15-11:30—Studies on Lipo-Chromes. Charles L. Connor, Faculty Instructor in Pathology, Harvard Medical School. Former Resident Pathologist.

11:30-11:45—The Pathogenesis of Erysipelas. Francis G. Blake, Professor of Medicine, Yale University School of Medicine; Physician-in-Chief, New Haven Hospital. Former Medical House-Officer, Assistant Resident and Resident Physician.

11:45-12:00—Some Aspects of the Reticulo-endothelial System. Cornelius P. Rhoads. Former Surgical House-Officer.

12:00-12:15—The Effects of Various Methods of Producing Myocardial Damage Using the Albino Rat. Charles L. Brown, Junior Associate in Medicine.

12:15-12:30—Localized Allergy. Harry L. Alexander, Associate Professor of Medicine, Washington University, and Associate Physician, Barnes Hospital. Former Assistant Resident Physician.

12:30-12:45—The Anterior Lobe of the Pituitary Gland and Experimental Acromegaly. Tracy J. Putnam, Associate in Surgery.

12:45-1:00—Unusual Complications of Bacterial Endocarditis. Channing Frothingham, Physician.

2:30-2:45—Observations on 1637 Cholecystograms. Merrill C. Sosman, Roentgenologist.

2:45-3:00—The Circulation in Arteriosclerotic Gangrene. John J. Morton, Professor of Surgery, University School of Medicine and Dentistry, Rochester, New York. Former Surgical House-Officer.

3:00-3:15—Some Unproved Impressions Concerning Heart Disease. Samuel A. Levine, Senior Associate in Medicine.

3:15-3:30—Some Aspects of the Treatment of Acute Rheumatic Fever. Clifford L. Derick, Physician.

3:30-3:45—Functions of the Surgical Clinic at Yale. Samuel C. Harvey, Professor of Surgery, Yale University School of Medicine; Surgeon-in-Chief, New Haven Hospital. Former Surgical House-Officer and Assistant Resident Physician.

3:45-4:00—The Progress of the Text-book of Surgery. John Homans, Surgeon.

4:00-4:15—An Unusual Case of Diabetes. Howard F. West, Associate Medical Director, Los Angeles Metabolic Clinic. Former Assistant Resident Physician and Resident Physician.

4:15-4:30—Title to be announced later. William T. Councilman, Professor of Pathology Emeritus, Harvard Medical School. Former Pathologist.

Friday, April 27th

In Amphitheatre

11:00-11:15—The Treatment of Pernicious Anemia with Liver Extract. George R. Minot, Consulting Physician.

11:15-11:30—A Study of the Dietary Habits of Patients with Pernicious Anemia. Cyrus C. Sturgis, Professor of Medicine, University of Michigan. Former Medical House-Officer, Assistant Resident Physician, Resident Physician, Associate Physician and Physician.

11:30-11:45—Metabolic Studies in Pernicious Anemia. Howard L. Alt, Resident Physician.

11:45-12:00—Observations on Beri-beri. George R. Harmann, Assistant Professor of Medicine, Tulane University. Former Medical House-Officer.

12:00-12:15—Solutions for Intravenous Injection in Low Blood-Pressure and Shock. Cecil K. Drinker, Professor of Physiology, Harvard. Former Medical House-Officer, and Resident Physician.

12:15-12:30—Transfusions in Acute Blood Loss. Clare E. Bird, Resident Surgeon.

12:30-12:45—Some Peculiar Bone Changes Found in Children with Splenic Anemia. Edward C. Vogt. Former House-Officer, Assistant Resident in X-Ray Department and Associate Roentgenologist.

12:45-1:00—Some Points of Interest Related to Bone Infection. Clarence L. Starr, Professor of Surgery, University of Toronto. Former Visiting Surgeon Pro Tempore.

2:30-2:45—End Result Studies in the Surgery of Chronic Valvular Disease of the Heart. Elliott C. Cutler, Professor of Surgery, Western Reserve University Medical School and Chief Surgeon, Lakeside Hospital. Former Surgical House-Officer, Resident Surgeon and Associate in Surgery.

2:45-3:00—Velocity of Blood Flow in Health and Disease. Hermann L. Blumgart, Assistant Physician, Thorndike Memorial Laboratory. Former Medical House-Officer.

3:00-3:15—Common Clinical Errors as Seen by a Psychiatrist. John A. P. Millet, Associate Physician, Austen Riggs Foundation, Stockbridge. Former Medical House-Officer.

3:15-3:30—The Roentgen Study of the Pharynx and Trachea with Especial Reference to Retropharyngeal Abscess. Lawrence Reynolds, Assistant Roentgenologist, Harper Hospital, Detroit. Former Roentgenologist.

3:30-3:45—Pneumonia in Isolated Rural Communities. Wilson G. Smillie. Assistant Director for U. S. International Health Board. Former Medical House-Officer and Assistant Resident Physician.

3:45-4:00—Post-Operative Massive Atelectasis. W. J. Merle Scott. Assistant Professor of Surgery, University of Rochester. Former Associate in Surgery and Assistant Resident Surgeon.

4:00-4:15—Experimental Abscess of the Lung. Factors in Chronicity. Louis G. Herrmann. Assistant Resident Surgeon, Lakeside Hospital, Cleveland. Former Medical House-Officer.

4:15-4:30—Electrosurgical Methods of Attacking Intracranial Tumors. Harvey Cushing, Surgeon-in-Chief.

Saturday, April 28th

In Amphitheatre

11:00-11:15—Emotional Polycythemia. Walter B. Cannon, Consulting Physiologist.

11:15-11:30—One or Two Points Concerning the Management of a Brain Abscess Case. Kenneth G. McKenzie, Surgical Staff, Toronto General Hospital. Former Assistant Resident Surgeon.

11:30-11:45—Angiomatosis of the Retina and Its Relation to Lindau's Disease. Percival Bailey, Associate in Surgery.

11:45-12:00—The Treatment of Arthritis. Francis C. Hall, Associate in Medicine.

12:00-12:15—Sacro-Iliac Joint X-Ray Changes Interpreted on the Basis of Histological Changes. Marius N. Smith-Petersen. Visiting Orthopedic Surgeon, Massachusetts General Hospital. Former Surgical House-Officer.

12:15-12:30—Observations upon the Production of Cerebrospinal Fluid. Roy G. Spurling, Instructor in Surgery, University of Louisville, School of Medicine. Former Surgical House-Officer and Assistant Resident Surgeon.

12:30-12:45—Relapsing Febrile Nodular Non-Suppurative Panniculitis. Henry A. Christian, Physician-in-Chief.

12:45-1:00—Recent Advances in Urologic Diagnosis. William C. Quinby, Urological Surgeon.

2:30-2:45—The Pathology of Deficiency Diseases. S. Burt Wolbach, Pathologist.

2:45-3:00—Results of Ulcer Therapy. Edward S. Emery, Jr., Associate in Medicine.

3:00-3:15—Failure in the Surgical Treatment of Peptic Ulcer. David Cheever, Surgeon.

3:15-3:30—Some Aspects of Epidemic Encephalitis. Henry R. Viets, Assistant Neurologist, Massachusetts General Hospital. Former Surgical House-Officer.

3:30-3:45—The Use of Salyrgen in Edema. James P. O'Hare, Senior Associate in Medicine.

3:45-4:00—Studies Upon the Behaviour of Free Cartilage in Joints. Robert M. Harbin, Assistant Professor of Orthopedic Surgery, Western Reserve University School of Medicine. Former Surgical House-Officer.

4:00-4:15—End Results in the Treatment of Diverticulitis of the Colon. Francis C. Newton, Senior Associate in Surgery.

4:15-4:30—Experiences with Cordotomy. Gilbert Horrax, Senior Associate in Neurological Surgery.

Physicians are cordially invited to attend the exercises.

THE HARVARD MEDICAL SOCIETY

The next regular meeting of the Harvard Medical Society will be held as usual in the amphitheatre of the Peter Bent Brigham Hospital Tuesday evening, at 8:15 o'clock.

The program follows:

Tercentennial Celebration of the publication of Harvey's De Motu Cordis. Speaker, Dr. Archibald Malloch, Librarian, New York Academy of Medicine.

PERCIVAL BAILEY, *Secretary.*

SOCIETY MEETINGS

April 20—Massachusetts Psychiatric Society. For detailed notice see page 376, issue of April 5.

April 24—The New Hampshire Surgical Club. Complete notice appears page 471.

April 24—Lawrence Cancer Clinic. See page 376, issue of April 5, for complete notice.

April 24—Boston Medical History Club. For complete notice see page 471.

April 24—Harvard Medical Society. For detailed notice see page 476.

April 26—Massachusetts Association of Boards of Health. For detailed notice see page 472.

April 26, 27, and 28—Fifteenth Reunion of the Peter Bent Brigham Hospital Alumni. Complete notice appears on page 475.

April 30—Annual Meeting of the Massachusetts Tuberculosis League. For complete notice see page 471.

May 1-2—American Climatological and Clinical Association. See page 474 for complete notice.

May 10-11—Conference on Rheumatic Diseases. Detailed notice appears on page 472.

June 18-20—Meeting of the American Association for the Study of Goiter. See page 425, issue of April 12, for complete notice.

June 18-22—Convention of the Catholic Hospital Association. Complete notice appears on page 1597, issue of February 16.

DISTRICT MEDICAL SOCIETIES

Essex North District Medical Society

May 2, 1928 (Wednesday)—Annual meeting at Haverhill, 12:30 P. M., at the Haverhill Country Club, Brickett Hill, Gile Street, Haverhill.

May 3, 1928 (Thursday)—Censors meet for examination of candidates at Hotel Bartlett, 95 Main Street, Haverhill, at 2 P. M. Candidates should apply to the Secretary, J. Forrest Burnham, M.D., 567 Haverhill Street, Lawrence, at least one week prior.

Essex South District Medical Society

May 3 (Thursday)—Censors meet at Salem Hospital for the examination of candidates at 3:30 P. M. Candidates should apply to the Secretary, Dr. R. E. Stone, Beverly, at least one week prior.

May 8 (Tuesday)—Annual meeting. Detailed notice appears on page 1437, issue of January 26.

Norfolk District Medical Society

May 3—Censors' meeting. Roxbury Masonic Temple, 4 P. M. Applications will be mailed by the Secretary upon request. Detailed notice appears on page 271, issue of March 22.

May 8—Annual meeting. Details to be announced.

Suffolk District Medical Society

Combined meeting of the Suffolk District Medical Society and the Boston Medical Library will be held at the Boston Medical Library, 8 The Fenway, at 8:15 P. M., as follows:

April 25—Annual meeting. Election of officers.

Subject of the evening: "Problems of Obesity," Professor Julius Bauer, University of Vienna, Austria.

Discussion to be opened by Drs. George C. Smith, Francis H. McCrudden and James P. O'Hare.

Dr. Bauer is Professor of Medicine in the University of Vienna. Since the beginning of his career at the University of Innsbruck he has continued studies on the relation between constitution and disease. His outstanding achievement is raising the interest of physicians to appreciate the significance of constitution in disease. In this line of work he is unquestionably the most prominent man on the continent.

Light refreshments after the meeting.

The medical profession is cordially invited to attend this meeting.

April 27—Special meeting. Detailed notice appears on page 471.

May 3—Censors' Meeting.

The Censors of the Suffolk District Medical Society will meet for the examination of candidates at the Medical Library, No. 8 The Fenway, Thursday, May 3, 1928, at 4 o'clock.

Candidates should make personal application to the Secretary, and present their medical diploma at least one week before the examination.

ARTHUR H. CROSBIE, M.D., Secretary.
520 Commonwealth Avenue, Boston.

Notices of meetings must reach the JOURNAL office on the Friday preceding the date of issue in which they are to appear.